

PROJECT MANUAL
JHS Project No. 961
2.6.12

Maxcy College Renovation

State Project # H27-6073-AC

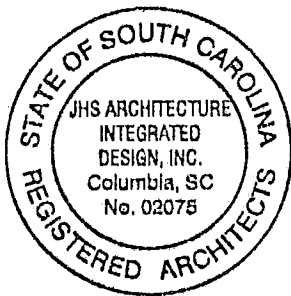
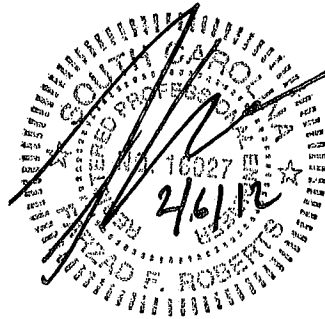
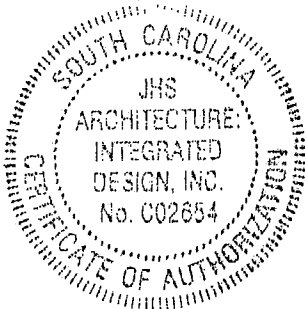
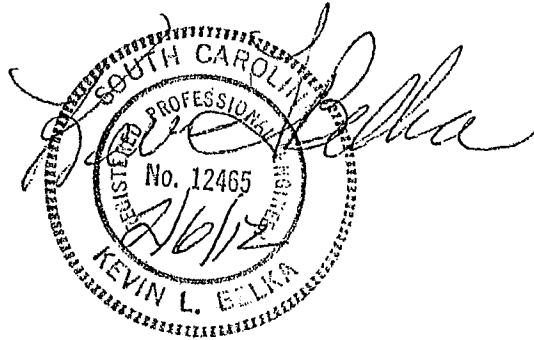
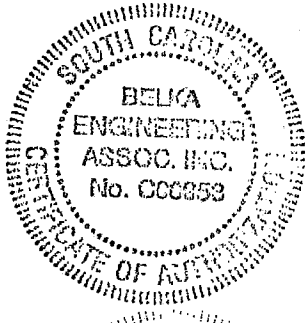
UNIVERSITY OF SOUTH CAROLINA
COLUMBIA, SOUTH CAROLINA



1812 Lincoln Street . Columbia . South . Carolina . 29201 . 803.252.2400

SECTION 00 0107

SEALS PAGE



SECTION 00 0010

TABLE OF CONTENTS

DOCUMENTS 0 -- INTRODUCTORY INFORMATION, BIDDING REQUIREMENTS, AND CONTRACT REQUIREMENTS

00 0007 - SEALS PAGE

00 0010 - TABLE OF CONTENTS

SE-310- INVITATION TO BID

A701 - INSTRUCTIONS TO BIDDERS (AIA DOCUMENT)

00201 - OSE STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

SE-330 – STANDARD BID FORM

A101 - STANDARD FORM OF AGREEMENT BETWEEN OWNER & CONTRACTOR

AIA DOCUMENT A101 - 2007 EDITION

00501 - OSE STANDARD MODIFICATION TO AIA A101-2007

A201 -GENERAL CONDITIONS TO THE CONTRACT FOR CONSTRUCTION

AIA DOCUMENT A201-2007 EDITION

00811 - OSE STANDARD SUPPLEMENTARY CONDITIONS

USC SUPPLEMENTAL GENERAL CONDITIONS OF CONSTRUCTION PROJECTS

CAMPUS VEHICLE EXPECTATIONS

CONTRACTOR'S ONE YEAR GUARANTEE

A310 – BID BOND

SE-355 - PERFORMANCE BOND

SE-357 - LABOR AND MATERIAL PAYMENT BOND

SE-480 - CHANGE ORDER TO CONSTRUCTION CONTRACT

DIVISION 1 -- GENERAL REQUIREMENTS

01 1000 –SUMMARY

01 2000 - PRICE AND PAYMENT PROCEDURES

01 3000 - ADMINISTRATIVE REQUIREMENTS

01 3515 – LEED REQUIREMENTS

01 4000 - QUALITY REQUIREMENTS

TABLE 5-15 STATEMENT OF SPECIAL INSPECTIONS

01 5000 - TEMPORARY FACILITIES AND CONTROLS

01 6000 - PRODUCT REQUIREMENTS

01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

01 7800 - CLOSEOUT SUBMITTALS

DIVISION 2 -- SITE CONSTRUCTION

02 4100 - DEMOLITION

DIVISION 3 – CONCRETE (Not Used)

DIVISION 4 – MASONRY (Not Used)

DIVISION 5 – METALS (Not Used)

DIVISION 6 – WOOD AND PLASTICS

06 1000 – ROUGH CARPENTRY

06 4100 – ARCHITECTURAL WOOD CASEWORK

06 4216 – WOOD-VENEER PANELING

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

07 3126 – SLATE SHINGLES

07 6200 – SHEET METAL FLASHING AND TRIM

07 8400 – FIRE STOPPING

07 9005 – JOINT SEALERS

DIVISION 8 – DOORS AND WINDOWS

08 1113 – HOLLOW METAL DOORS AND FRAMES

08 1416 – FLUSH WOOD DOORS

08 3100 – ACCESS DOORS AND PANELS

08 4110 – ALUMINUM WINDOW SYSTEM

08 4313 – ALUMINUM FRAMED STOREFRONTS

08 5113 – ALUMINUM WINDOWS

08 7100 – DOOR HARDWARE

08 8000 - GLAZING

08 8300 - MIRRORS

DIVISION 9 – FINISHES

09 2116 – GYPSUM BOARD ASSEMBLIES

09 3000 - TILING

09 5100 – ACOUSTICAL CEILING

09 6429 – WOOD STRIP AND PLANK FLOORING

09 6500 – RESILIENT FLOORING

09 6800 – CARPETING

09 9000 – PAINT AND COATINGS

DIVISION 10 – SPECIALTIES (Not Used)

DIVISION 11 – EQUIPMENT

11 3100 – RESIDENTIAL APPLIANCES

11 4000 – FOODSERVICE EQUIPMENT

11 4100 – AUTOMATIC RESIDENTIAL FIRE EXTINGUISHER SYSTEM

DIVISION 12 – FURNISHINGS

12 3600 - COUNTERTOPS

DIVISION 13 – SPECIAL CONSTRUCTION (Not Used)

DIVISION 14 – CONVEYING SYSTEMS (Not Used)

DIVISION 15 – RESERVED (Not Used)

DIVISION 16 – RESERVED (Not Used)

DIVISION 17 – RESERVED (Not Used)

DIVISION 18 – RESERVED (Not Used)

DIVISION 19 – RESERVED (Not Used)

DIVISION 20 – RESERVED (Not Used)

DIVISION 21 – FIRE SUPPRESSION

21 0000 – FIRE SUPPRESSION

DIVISION 22 – PLUMBING

22 0500 – COMMON WORK RESULTS FOR PLUMBING

22 0523 – GENERAL-DUTY VALVES FOR PLUMBING PIPING

22 1100 – FACILITY WATER DISTRIBUTION

22 1310 – FACILITY SANITARY SEWER AND DRAIN PIPING

22 2030 – NATURAL GAS PIPING

22 4000 – PLUMBING FIXTURES

DIVISION 23 – HEATING, VENTILATION, AIR CONDITIONING (HVAC)

23 0500 – COMMON WORK RESULTS FOR HVAC

23 0553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

23 0593 – TESTING, ADJUSTING AND BALANCING FOR HVAC

23 0700 – HVAC INSULATION

23 2010 – HVAC PIPING

23 2131 – END SUCTION PUMP

23 2200 – STEAM AND CONDENSATE PIPING ACCESSORIES

23 2500 – HVAC WATER TREATMENT

23 3000 – HVAC AIR DISTRIBUTION

23 3416 – EXHAUST FANS

23 3600 – FAN COIL UNITS

23 5700 – HEAT EXCHANGERS FOR HVAC

23 7300 – OUTDOOR AIR UNITS

DIVISION 24 – RESERVED (Not Used)

DIVISION 25 – INTEGRATED AUTOMATION

25 5000 – INTERGRATED AUTOMATIC FACILITY CONTROLS

DIVISION 26 – ELECTRICAL

260500 – BASIC ELECTRICAL MATERIALS AND METHODS

260519 – CONDUCTORS & CABLES

260526 – GROUNDING AND BONDING

260529 – ELECTRICAL SUPPORTS AND SEISMIC RESTRAINTS

260533 – RACEWAYS AND BOXES

260553 – ELECTRICAL IDENTIFICATION

262416 - PANELBOARDS

262726 – WIRING DEVICES

262813 – FUSES

262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS

264313 – SURGE PROTECTIVE DEVICES

265100 – INTERIOR LIGHTING

DIVISION 27 – COMMUNICATIONS

271000 – COMMUNICATION AND DATA-PROCESSING EQUIPMENT

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

283100 – FIRE ALARM SYSTEM

DIVISION 31 -- EARTHWORK

DIVISION 32 -- EXTERIOR IMPROVEMENTS

DIVISION 33 -- UTILITIES

DIVISION 34 -- TRANSPORTATION

DIVISION 35 -- WATERWAY AND MARINE CONSTRUCTION

DIVISION 36 -- RESERVED (NOT USED)

DIVISION 37 -- RESERVED (NOT USED)

DIVISION 38 -- RESERVED (NOT USED)

DIVISION 39 -- RESERVED (NOT USED)

DIVISION 40 -- PROCESS INTEGRATION

DIVISION 41 -- MATERIAL PROCESSING AND HANDLING EQUIPMENT

DIVISION 42 -- PROCESS HEATING, COOLING, AND DRYING EQUIPMENT

DIVISION 43 -- PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT

DIVISION 44 -- POLLUTION CONTROL EQUIPMENT

DIVISION 45 -- INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT

DIVISION 46 -- RESERVED (NOT USED)

DIVISION 47 -- RESERVED (NOT USED)

DIVISION 48 -- ELECTRICAL POWER GENERATION

DIVISION 49 -- RESERVED (NOT USED)

END OF TABLE OF CONTENTS

REQUEST FOR ADVERTISEMENTPROJECT NAME: MAXCY COLLEGE RENOVATIONPROJECT NUMBER: H27-6073-ACPROJECT LOCATION: COLUMBIA, SOUTH CAROLINA

Contractor may be subject to performance appraisal at close of project

BID SECURITY REQUIRED? Yes No PERFORMANCE & PAYMENT BONDS REQUIRED? Yes No CONSTRUCTION COST RANGE: 2,197,000 - 2,544,000

DESCRIPTION OF PROJECT: The Project consists of the renovation of an approximately 45,000 SF, historic dormitory building. The construction activities include: Replacement of the existing HVAC system throughout the building, the upfit of two new faculty suites, resident hall director suite, four offices, a classroom, lobby, new dining room and a demonstration kitchen. Also included in the work will be associated plumbing, electrical and structural work.

Construction will be performed during the summer while the building is not occupied. The general contractor will have 85 days to complete the work. Contractor's responsibility also includes removing and securely storing the existing furnishings in a manner to prevent damage and returning the furnishing to the original location. The Contractor is also responsible for coordinating construction activities with USC Facilities, USC Fire Marshal, USC Security and USC Technology Service crews, furnishing contractors, equipment suppliers and others. The project will be constructed to achieve a LEED Silver certification. Contractor may be subject to performance appraisal at close of project. _____

A/E NAME: JHS Architecture; Integrated DesignA/E CONTACT: Clint BurdettA/E ADDRESS: Street/PO Box: 1812 Lincoln St. Suite 300City: ColumbiaState: SC ZIP: 29201-EMAIL: cburdett@jhs-architects.comTELEPHONE: 803 252-2400FAX: 803 252-1630

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

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: ARC @ 803-254-2561 and purchasing.sd.eduPLAN DEPOSIT AMOUNT: \$ 100.00 IS DEPOSIT REFUNDABLE: Yes No

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

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

PRE-BID CONFERENCE? Yes No MANDATORY ATTENDANCE? Yes No DATE: 3/8/12 TIME: 10:00 PLACE: 743 Greene StreetAGENCY: University of South CarolinaNAME OF AGENCY PROCUREMENT OFFICER: Michelle Adams, Procurement ManagerADDRESS: Street/PO Box: 743 Greene StreetCity: ColumbiaState: SC ZIP: 29208-EMAIL: madams@fmc.sc.eduTELEPHONE: 803 777-0981FAX: 803 777-7334BID CLOSING DATE: 3/22/12 TIME: 2:00 LOCATION: 743 Greene Street

BID DELIVERY ADDRESSES:

HAND-DELIVERY: Attn: Kay KeislerMAIL SERVICE: Attn: : Kay KeislerUniversity of South Carolina - Facilities CenterUniversity of South Carolina - Facilities Center743 Greene Street743 Greene StreetColumbia, SC 29208Columbia, SC 29208IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? (*Agency MUST check one*) Yes No APPROVED BY (*Office of State Engineer*): _____

DATE: _____

INSTRUCTIONS TO BIDDERS

AIA DOCUMENT A701 - 1997 EDITION - INSTRUCTIONS TO BIDDERS is available at the Office of the State Engineer for the bidder's review.

OSE FORM 00201

STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

OWNER: University of South Carolina
PROJECT NUMBER: H27-6073-AC
PROJECT NAME: Maxcy College Renovation
PROJECT LOCATION: Columbia, South Carolina

PROCUREMENT OFFICER: Michelle Adams

1. STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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

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

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

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

2. MODIFICATIONS TO A701-1997

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

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

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

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

2.4. *In Section 2.1.1:*

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

Insert the following at the end of this section:

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

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

and accepts full responsibility for any pre-bid existing conditions that would affect the Bid that could have been ascertained by a site visit. As provided in Regulation 19-445.2042(B), A bidder’s failure to attend an advertised pre-bid conference will not excuse its responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the State.

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

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

2.2 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

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

(a) By submitting an bid, the bidder certifies that—

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

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

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

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

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

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

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

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

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

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

2.3 DRUG FREE WORKPLACE

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

2.4 CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS

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

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

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

(B) Have not, within a three-year period preceding this bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in

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

connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

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

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

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

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

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

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

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

2.5 ETHICS CERTIFICATE

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

2.6 RESTRICTIONS APPLICABLE TO BIDDERS & GIFTS

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

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

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

2.7. Delete Section 3.1.1 and substitute the following:

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

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

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

2.10. Insert the following Section 3.1.5

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

2.11. In Section 3.2.2:

Delete the words "and Sub-bidders"

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

2.12. In Section 3.2.3:

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

Insert the following at the end of the section:

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

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

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

2.14. Delete Section 3.3.2 and substitute the following:

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

2.15. Delete Section 3.4.3 and substitute the following:

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

OSE FORM 00201**STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.16. Insert the following Sections 3.4.5 and 3.4.6:**

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

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

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

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

2.19. Delete Section 4.1.3 and substitute the following:

4.1.3 Sums shall be expressed in figures.

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

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

2.21. Delete Section 4.1.5 and substitute the following:

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

2.22. Delete Section 4.1.6 and substitute the following:

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

2.23. Delete Section 4.1.7 and substitute the following:

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

2.24. Delete Section 4.2.1 and substitute the following:

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

OSE FORM 00201**STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.25. Delete Section 4.2.2 and substitute the following:**

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

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

2.26. Delete Section 4.2.3 and substitute the following:

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

2.27. Insert the following Section 4.2.4:

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

2.28. Delete Section 4.3.1 and substitute the following:

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

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

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

2.30. Delete Section 4.4.2 and substitute the following:

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

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

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

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

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

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

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

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

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

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

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

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

5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.

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

6.1 CONTRACTOR'S RESPONSIBILITY

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

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

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

2.37. *Insert the following Section 6.4*

6.4 CLARIFICATION

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

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

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

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

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

OSE FORM 00201**STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS****2.41. Delete Section 7.2.1 and substitute the following:**

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

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

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

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

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

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

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

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

9.2 CONTRACTOR LICENSING

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

9.3 SUBMITTING CONFIDENTIAL INFORMATION

For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that Bidder contends contains information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in Section 11-35-410. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that Bidder contends is protected by Section 11-35-1810. All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text. Do not mark your entire bid as confidential, trade secret, or protected! If your bid, or any part thereof, is improperly marked as confidential or trade

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

secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page. By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract (including, but not limited to, documents contained in a response, documents submitted to clarify a response, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure. In determining whether to release documents, the State will detrimentally rely on Bidders's marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED". By submitting a response, Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney's fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

9.4 POSTING OF INTENT TO AWARD

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

Room or Area of Posting: Lobby/Reception Area

Building Where Posted: Facilities Service Center

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

WEB site address (if applicable): purchasing.sc.edu

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

9.5 PROTEST OF SOLICITATION OR AWARD

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

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

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

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

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

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

9.6 SOLICITATION INFORMATION FROM SOURCES OTHER THAN OFFICIAL SOURCE

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

9.7 BUILDER'S RISK INSURANCE

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

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

9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS

Pursuant to Section 12-6-3350, taxpayers, who utilize certified minority subcontractors, may take a tax credit equal to 4% of the payments they make to said subcontractors. The payments claimed must be based on work performed directly for a South Carolina state contract. The credit is limited to a maximum of fifty thousand dollars annually. The taxpayer is eligible to claim the credit for 10 consecutive taxable years beginning with the taxable year in which the first payment is made to the subcontractor that qualifies for the credit. After the above ten consecutive taxable years, the taxpayer is no longer eligible for the credit. The credit may be claimed on Form TC-2, "Minority Business Credit." A copy of the subcontractor's certificate from the Governor's Office of Small and Minority Business (OSMBA) is to be attached to the contractor's income tax return. Taxpayers must maintain evidence of work performed for a State contract by the minority subcontractor. Questions regarding the tax credit and how to file are to be referred to: SC Department of Revenue, Research and Review, Phone: (803) 898-5786, Fax: (803) 898-5888. The subcontractor must be certified as to the criteria of a "Minority Firm" by the Governor's Office of Small and Minority Business Assistance (OSMBA). Certificates are issued to subcontractors upon successful completion of the certification process. Questions regarding subcontractor certification are to be referred to: Governor's Office of Small and Minority Business Assistance, Phone: (803) 734-0657, Fax: (803) 734-2498. Reference: SC §11-35-5010 – Definition for Minority Subcontractor & SC §11-35-5230 (B) – Regulations for Negotiating with State Minority Firms.

§ 9.9 OTHER SPECIAL CONDITIONS OF THE WORK

1. See Article 3. 104 and 3.105 of 00811-OSE Standard Supplemental Conditions Modifying Article 11.4 of AIA Document A201, 2007 Edition, Required contractor to provide builder's risk insurance on the project.
2. Contractor shall comply with USC Supplementary Conditions
3. Contractor shall comply with the attached "Certification of Illegal Immigration (November 2008)"

END OF DOCUMENT

A101 – 2007 Edition

**STANDARD FORM OF AGREEMENT BETWEEN
OWNER AND CONTRACTOR**

(Replacement Page)

*Original AIA Document on file at the office
of Facilities Business and Finance
743 Greene Street, Columbia, SC*

**SE-330 – LUMP SUM BID
BID FORM**

**INSTRUCTIONS FOR
SUBCONTRACTOR LISTING**

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

BID SUBMITTED BY: _____
(Bidder's Name)

BID SUBMITTED TO: _____
(Owner's Name)

FOR PROJECT: PROJECT NAME Maxcy College Renovation
PROJECT NUMBER H27-6073-AC

OFFER

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

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

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

(Bidder check one)

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

ADDENDUM No: _____

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

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

§ 6.1 **BASE BID WORK** *(as indicated in the Bidding Documents and generally described as follows):* All work shown on the drawings and specifications.

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

**SE-330 – LUMP SUM BID
BID FORM**

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

§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES

a. **CONTRACT TIME:** Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner. Bidder agrees to substantially complete the Work within **75** calendar days from the date of student evacuation, and **10** more days to Final Completion .

b. **LIQUIDATED DAMAGES:** Bidder further agrees that from the compensation to be paid, the owner shall retain as liquidated damages the sum of \$4,000.00 a day for the first 15 days and \$100 per bed per day, thereafter, for every day that passes after 85days Final Completion without a Certificate of Occupancy. Likewise the Owner shall award a bonus of \$4,000 a day for an early Certificate of Occupancy for every day prior to 85days Final Completion with a cap not to exceed \$20,000.00. This sum is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

§ 10. AGREEMENTS

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

§ 11. ELECTRONIC BID BOND

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

Electronic Bid Bond Number: _____

Signature and Title: _____

**SE-330 – LUMP SUM BID
BID FORM**

BIDDER'S TAXPAYER IDENTIFICATION

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER: _____

OR

SOCIAL SECURITY NUMBER: _____

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS

Classification(s) & Limits: _____

Subclassification(s) & Limits: _____

SC Contractor's License Number(s): _____

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

SIGNATURE

BIDDER'S LEGAL NAME: _____

ADDRESS: _____

BY: _____
(Signature)

DATE: _____

TITLE: _____

TELEPHONE: _____

EMAIL: _____

AIA – A101 Standard Form of Agreement Between Owner and Contractor

AIA DOCUMENT A101 - 2007 EDITION - Standard Form of Agreement Between Owner and Contractor is available at the office of Construction Services at 743 Greene Street, Columbia, SC; for the bidder's review.

OSE FORM 00501

STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

OWNER: University of South Carolina

PROJECT NUMBER: H27-6073-AC

PROJECT NAME: Maxcy College Renovation

1. STANDARD MODIFICATIONS TO AIA A101-2007

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

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

2. MODIFICATIONS TO A101

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

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

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

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

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

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

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

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

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

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

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

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

OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN
OWNER AND CONTRACTOR

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

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

2.8. *In Section 5.1.9, delete the words "Except with the Owner's prior approval, the" before the word "Contractor."*

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

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

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

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

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

Name: Tom Opal

Title: Senior Project Manager

Address: 743 Greene Street
Columbia, South Carolina 29208

Telephone: (803)777-7076 FAX: (803) 777-8739

Email: _____

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

Name: Fadi Shatnawi

Title: Project Manager

Address: 743 Greene Street
Columbia, South Carolina 29208

Telephone: (803) 777-0320 FAX: (803) 777-8739

Email: _____

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

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

Name: _____

Title: _____

Address: _____

Telephone: _____ FAX: _____

Email: _____

OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN
OWNER AND CONTRACTOR

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

Name: _____
 Title: _____
 Address: _____
 Telephone: _____ FAX: _____
 Email: _____

2.14. *Add the following Section 8.6.1:*

8.6.1 The Architect's representative:

Name: Clint Burdett
 Title: Project Architect
 Address: 1812 Lincoln Street, Third Floor, Columbia, SC 29201
 Telephone: (803) 252-2400 FAX: (803) 252-1630
 Email: cburdett@jhs-architects.com

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

Invitation for Construction Bids (SE-310)
Instructions to Bidders (AIA Document A701-1997)
Standard Supplemental Instructions to Bidders (OSE Form 00201)
Contractor's Bid (Completed SE-330)
Notice of Intent to Award (Completed SE-370)
Certificate of procurement authority issued by the SC Budget & Control Board

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

END OF DOCUMENT

SECTION 00 7200

GENERAL CONDITIONS

PART 1 GENERAL

1.01 FORM OF GENERAL CONDITIONS

- A. General Conditions of the Contract for Construction (AIA Document A201-1997 Edition).

1.02 RELATED REQUIREMENTS

- A. Section 00811-OSE Supplementary Conditions.

PART 2 PRODUCTS (NOT USED)

2.01 SUPPLEMENTARY CONDITIONS

- A. Refer to Document 00811-OSE for amendments to these General Conditions.

PART 3 EXECUTION

3.01 COPIES OF DOCUMENTS

- A. Copies of the General Conditions are available for examination at the office of the State Engineer. Copies of the Form of Agreement may be obtained from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, DC 20006 or from local AIA Offices

END OF DOCUMENT

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

OWNER: University of South Carolina

PROJECT NUMBER: H27-6073-AC

PROJECT NAME: Maxcy College Renovation

1 GENERAL CONDITIONS

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

2 STANDARD SUPPLEMENTARY CONDITIONS

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

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

3 MODIFICATIONS TO A201-2007

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

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

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

3.3 *Add the following Section 1.1.9:*

1.1.9 NOTICE TO PROCEED

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

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

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

3.5 *Delete Section 1.5.1 and substitute the following:*

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

3.6 *Delete Section 2.1.1 and substitute the following:*

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

3.7 *Delete Section 2.1.2 and substitute the following:*

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

3.8 *Delete Section 2.2.3 and substitute the following:*

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

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

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

3.10 *Delete Section 2.2.5 and substitute the following:*

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

3.11 *Add the following Sections 2.2.6 and 2.2.7:*

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

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

3.12 *Delete Section 2.4 and substitute the following:*

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

The Contractor acknowledges that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including but not limited to (1) conditions bearing upon transportation, disposal, handling, and storage of materials; (2) the availability of labor, water, electric power, and roads; (3) uncertainties of weather, river stages, tides, or similar physical conditions at the site; (4) the conformation and conditions of the ground; and (5) the character of equipment and facilities needed preliminary to and during work performance. The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Owner, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Owner.

3.14 *In the third sentence of Section 3.2.4, insert the word “latent” before the word “errors.”*

3.15 *In the last sentence of Section 3.3.1, insert the words “by the Owner in writing” after the word “instructed.”*

3.16 *Delete the third sentence of Section 3.5 and substitute the following sentences:*

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

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

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

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

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

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

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

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

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

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

acceptable to the Owner,

3.22 *Delete Section 3.9.2 and substitute the following:*

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

3.24 *Delete Section 3.10.3 and substitute the following:*

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

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

3.25 *Add the following Section 3.10.4:*

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

3.26 *Add the following Section 3.12.5.1:*

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

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

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

3.29 Add the following Sections 3.13.2 and 3.13.3:

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

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

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

including loss of use resulting therefrom,

3.31 *Delete Section 4.1.1 and substitute the following:*

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

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

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

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

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

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

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

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

Work completed and correlated with the

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

3.38 *Delete Section 4.2.14 and substitute the following:*

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

3.39 *Delete Section 5.2.1 and substitute the following:*

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

3.40 *Delete Section 5.2.2 and substitute the following:*

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

3.41 *In the first sentence of Section 5.2.3, delete the words "...or Architect..." in the two places they appear.*

3.42 *Delete the words "...or Architect..." in the in the first sentence of Section 5.2.4 and insert the following sentence at the end of Section 5.2.4:*

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

3.43 *Add the following Section 5.2.5:*

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

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

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

3.45 *Delete the last sentence of Section 5.4.1.*

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

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

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

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

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

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

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

3.49 *Delete Section 7.2.1 and substitute the following:*

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

- .1 The change in the Work;

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

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

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

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

3.51 *Delete 7.3.3 and substitute the following:*

7.3.3 PRICE ADJUSTMENTS

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

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

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

3.52 *Delete Section 7.3.7 and substitute the following:*

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

OSE FORM 00811**STANDARD SUPPLEMENTARY CONDITIONS**

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

3.53 *Delete Section 7.3.8 and substitute the following:*

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

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

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

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

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

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

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

§ 7.6.3 Records Retention.

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

3.55 Delete Section 8.2.2 and substitute the following:

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

3.56 Delete Section 8.3.1 and substitute the following:

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

3.57 Insert the following at the end of Section 9.1:

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

3.58 Delete Section 9.2 and substitute the following:

9.2 SCHEDULE OF VALUES

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

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

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

3.59 Delete Section 9.3.1 and substitute the following:

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

Insert the following at the end of Section 9.3.2:

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

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

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

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

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

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

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

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

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

3.64 *Delete Section 9.7 and substitute following:*

9.7 FAILURE OF PAYMENT

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

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

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

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

3.67 *Delete Section 9.8.3 and substitute the following:*

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

OSE FORM 00811**STANDARD SUPPLEMENTARY CONDITIONS**

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

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

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

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

3.70 *Delete Section 9.10.1 and substitute the following:*

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

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

3.73 Delete Section 9.10.5 and substitute the following:

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

3.74 Add the following Section 9.10.6:

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

3.75 Delete Section 10.3.1 and substitute the following:

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

3.76 Insert the following at the end of Section 10.3.2:

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

3.77 Delete Section 10.3.3 and substitute the following:

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

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

In addition to its obligations under Section 3.18, the

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

OSE FORM 00811
STANDARD SUPPLEMENTARY CONDITIONS

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

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

3.81 *Delete 11.1.2 and substitute the following:*

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

(1) COMMERCIAL GENERAL LIABILITY:

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

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

- (a) Combined Single Limit \$1,000,000

(3) WORKER’S COMPENSATION:

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

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

3.82 *Delete Section 11.1.3 and substitute the following:*

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

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

3.83 *Delete Section 11.1.4 and substitute the following:*

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

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

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

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

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

3.87 *Delete Section 11.3.2 and substitute the following:*

11.3.2 BOILER AND MACHINERY INSURANCE

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

3.88 *Delete Section 11.3.3 and substitute the following:*

11.3.3 LOSS OF USE INSURANCE

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

3.89 *Delete Section 11.3.4 and substitute the following:*

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

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

3.91 *Delete Section 11.3.6 and substitute the following:*

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

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

3.94 Delete Section 11.3.9 and substitute the following:

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

3.95 Delete Section 11.3.10 and substitute the following:

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

3.96 Delete Section 11.4.1 and substitute the following:

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

3.97 Delete Section 11.4.2 and substitute the following:

11.4.2 The Performance and Labor and Material Payment Bonds shall:

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

3.98 *Add the following Sections 11.4.3 and 11.4.4:*

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

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

3.99 *Delete Section 12.1.1 and substitute the following:*

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

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

3.101 *In Section 12.2.2.3, add the following to the end of the sentence:*

unless otherwise provided in the Contract Documents.

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

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

3.103 *Delete Section 13.1 and substitute the following:*

13.1 GOVERNING LAW

The Contract, any dispute, claim, or controversy relating to the Contract, and all the rights and obligations of the parties shall, in all respects, be interpreted, construed, enforced and governed by and under the laws of the State of South Carolina, except its choice of law rules.

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

13.2 SUCCESSORS AND ASSIGNS

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

3.105 *Delete Section 13.3 and substitute the following:*

13.3 WRITTEN NOTICE

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

Unless expressly provided otherwise,

3.107 *Add the following Section 13.4.3:*

13.4.3 Notwithstanding Section 9.10.4, the rights and obligations which, by their nature, would continue beyond the termination, cancellation, rejection, or expiration of this contract shall survive such termination, cancellation, rejection, or expiration, including, but not limited to, the rights and obligations created by the following clauses:

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

3.5 Warranty

3.17 Royalties, Patents and Copyrights

3.18 Indemnification

7.6 Cost or Pricing Data

11.1 Contractor's Liability Insurance

11.4 Performance and Payment Bond

15.1.6 Claims for Listed Damages

15.1.7 Waiver of Claims Against the Architect

15.6 Dispute Resolution

15.4 Service of Process

3.108 *Delete Section 13.6 and substitute the following:*

13.6 INTEREST

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

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

3.110 *Add the following Sections 13.8 through 13.16:*

13.8 PROCUREMENT OF MATERIALS BY OWNER

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

13.9 INTERPRETATION OF BUILDING CODES

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

13.10 MINORITY BUSINESS ENTERPRISES

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

13.11 SEVERABILITY

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

13.12 ILLEGAL IMMIGRATION

Contractor certifies and agrees that it will comply with the applicable requirements of Title 8, Chapter 14 of the South Carolina Code of Laws and agrees to provide to the State upon request any documentation required to establish either: (a) that Title 8, Chapter 14 is inapplicable both to Contractor and its subcontractors or sub-subcontractors; or (b) that Contractor and its subcontractors or sub-subcontractors are in compliance with Title 8, Chapter 14. Pursuant to Section 8-14-60, "A person who knowingly makes or files any false, fictitious, or fraudulent document, statement, or report pursuant to this chapter is guilty of a felony, and, upon conviction, must be fined within the discretion of the court or imprisoned for not more than five years, or both." Contractor agrees to include in any contracts with its subcontractors language requiring its subcontractors to (a) comply with the applicable requirements of Title 8, Chapter 14, and (b) include in their contracts with the sub-subcontractors language requiring the sub-subcontractors to comply with the applicable requirements of Title 8, Chapter 14. (An overview is available at www.procurement.sc.gov)

13.13 SETOFF

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

13.14 DRUG-FREE WORKPLACE

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

13.15 FALSE CLAIMS

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

13.16 NON-INDEMNIFICATION:

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

3.111 *Delete Section 14.1.1 and substitute the following:*

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

3.113 *In Section 14.1.4, replace the word “repeatedly” with the word “persistently.”*

3.114 *Delete Section 14.2.1 and substitute the following:*

14.2.1 The Owner may terminate the Contract if the Contractor

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

3.115 *In Section 14.2.2, delete the parenthetical statement “, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action,” immediately following the word “Owner” in the first line.*

3.116 *In Section 14.2.4, replace the words “Initial Decision Maker” with the word “Architect”*

3.117 *Add the following Section 14.2.5:*

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

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

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

3.119 *Delete Section 14.4.1 and substitute the following:*

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

3.120 *Delete Section 14.4.2 and substitute the following:*

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

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

OSE FORM 00811
STANDARD SUPPLEMENTARY CONDITIONS

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

3.121 Delete Section 14.4.3 and substitute the following:

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

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

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

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

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

14.5 CANCELLATION AFTER AWARD BUT PRIOR TO PERFORMANCE

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

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

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

3.124 Delete Section 15.1.2 and substitute the following:

15.1.2 NOTICE OF CLAIMS

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

3.125 Delete Section 15.1.3 and substitute the following:

15.1.3 CONTINUING CONTRACT PERFORMANCE

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

OSE FORM 00811**STANDARD SUPPLEMENTARY CONDITIONS**

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

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

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

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

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

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

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

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

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

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

OSE FORM 00811

STANDARD SUPPLEMENTARY CONDITIONS

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

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

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

15.5 CLAIM AND DISPUTES - DUTY OF COOPERATION, NOTICE, AND ARCHITECTS

INITIAL DECISION

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

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

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

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

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

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

15.6 DISPUTE RESOLUTION

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

OSE FORM 00811
STANDARD SUPPLEMENTARY CONDITIONS

15.6.2 If after meeting in accordance with the provisions of Section 15.6.1, the Senior Representatives determine that the dispute cannot be resolved on terms satisfactory to both the Contractor and the Owner, then either party may submit the dispute by written request to South Carolina’s Chief Procurement Officer for Construction (CPOC). Except as otherwise provided in Article 15, all claims, claims, or controversies relating to the Contract shall be resolved exclusively by the appropriate Chief Procurement Officer in accordance with Title 11, Chapter 35, Article 17 of the South Carolina Code of Laws, or in the absence of jurisdiction, only in the Court of Common Pleas for, or in the absence of jurisdiction a federal court located in, Richland County, State of South Carolina. Contractor agrees that any act by the State regarding the Contract is not a waiver of either the State’s sovereign immunity or the State’s immunity under the Eleventh Amendment of the United State’s Constitution.

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

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

15.6.5 SERVICE OF PROCESS

Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any claims, claims, or controversies relating to the Contract; for any court action in connection therewith; or for the entry of judgment on any award made, may be served on Contractor by certified mail (return receipt requested) addressed to Contractor at the address provided for the Contractor’s Senior Representative or by personal service or by any other manner that is permitted by law, in or outside South Carolina. Notice by certified mail is deemed duly given upon deposit in the United States mail.

3.132 Add the following Article 16:

ARTICLE 16 PROJECT-SPECIFIC REQUIREMENTS AND INFORMATION

16.1. Inspection Requirements: *(Indicate the inspection services required by the Contract)*

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

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

Remarks: Owner will provide third party inspections where required.

OSE FORM 00811**STANDARD SUPPLEMENTARY CONDITIONS**

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

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

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

See Project Manual Section 01 7800 Closeout Submittals

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

See Project Manual Section 01 3000 Administrative Requirements

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

See Project Manual Section 01 5000 Temporary Facilities and Controls

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

See project Manual Section 01 7000 Execution Requirement

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

See Project manual Supplementary General Conditions

USC SUPPLEMENT GENERAL CONDITIONS
FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.
2. Fraternalization between Contractor's employees and USC students, faculty or staff is strictly prohibited – zero tolerance!
3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to \$500 per violation.
4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.
5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss or failure to return keys.
6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.
7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by USC Project Manager.
8. 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. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Vehicles parked in the lay down area (or designated parking areas) will clearly marked or display a CPC furnished placard for identification.

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with USC project Manager.
10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.
11. For all project over \$100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.
12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least _____ times per week. Construction waste must not be placed in University dumpsters. THE CONSTRUCTION SITE MUST BE THOROUGHLY CLEANED WITH ALL TRASH PICKED UP AND PROPERLY DISPOSED OF ON A DAILY BASIS AND THE SITE MUST BE LEFT IN A SAFE AND SANITARY CONDITION EACH DAY. THE UNIVERSITY WILL INSPECT JOB SITES REGULARLY AND WILL FINE ANY CONTRACTOR FOUND TO BE IN VIOLATION OF THIS REQUIREMENTS AN AMOUNT OF UP TO 1,000 PER VIOLATION.
13. **Contractor must provide all O&M manuals, as –built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.**
14. The contractor will comply with all regulations set forth by OSHA and SCDHEC. Contractor must also adhere to USC's internal policies and procedures (available by request). As requested, the contractor will submit all Safety Programs and Certificates of Insurance to the University for review.
15. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 5' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 4" layer of mulch shall be placed over the trees protection area to maintain moisture in the root zone.
16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000lbs., a 3/4 minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4 plywood is required.
17. For projects requiring heavy loads to cross walks tree root zones or lawns. A construction entry road consisting of 10'X16' oak logging mates on 12" coarse, chipped, hardwood base. Mulch and logging mates shall be supplemented throughout the project to keep

matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated before final payment is made.
19. Orange safety fence to be provided by the contractor. (USC Arborist, Kevin Curtis may be contacted at 777-0033 or 315-0319)

CAMPUS VEHICLE EXPECTATIONS

1. All motorized vehicles on the University campus are expected to travel and park on roadways and /or in parking stalls.
2. All motorized vehicle traffic on USC walkways must first receive the Landscape Managers authorization. Violators may be subject to fines and penalties.
3. All motorized vehicle that leak or drip liquids are prohibited from traveling or parking on walks landscapes areas.
4. Contractor, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.
5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.
6. Vehicle drivers who park on landscape or drivers must be able to produce written evidence of need or emergency requiring parking on same.
7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.
8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.
9. All incidents of property damage will be reported to Parking Services or the Work Management Center.
10. Parking on campus is restricted to space designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be "fixed". Parking spaces are restricted to work vehicles only; no personal vehicles.

Project Name: **Maxey College Renovation**

Project Number: **H27-6073-AC**

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 material and/or workmanship for a period of one (1) year from the 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 officer of the Contracting Firm

SWORN TO before me this

_____ day of _____, 20____ (seal)

_____ State

My commission expires _____

A310

BID BOND

(Replacement Page)

**The University of South Carolina will accept the AIA
A310 or the SE-335 (2008 Edition) bid bond forms.**

*Original AIA Document on file at the office
of Facilities Business and Finance
743 Greene Street, Columbia, SC*

Performance Bond

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

Name: _____
Address: _____

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

Name: _____
Address: _____

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

Name: University of South Carolina
Address: 743 Greene Street
Columbia, South Carolina 29208

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

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

State Project Name: Maxcy College Renovation
State Project Number: H27-6073-AC
Brief Description of Awarded Work, as found on the SE-330, Bid Form: All work shown on the drawings and specifications.

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

Name: JHS Architecture
Address: 1812 Lincoln Street
Columbia, South Carolina 29201

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

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

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

CONTRACTOR

SURETY

By: _____
(Seal)

By: _____
(Seal)

Print Name: _____

Print Name: _____

Print Title: _____

Print Title: _____
(Attach Power of Attorney)

Witness: _____

Witness: _____

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. Definitions

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

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

Labor and Material Payment Bond

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

Name: _____
Address: _____

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

Name: _____
Address: _____

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

Name: University of South Carolina
Address: 743 Greene Street
Columbia, South Carolina 29208

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

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

Project Name: Maxcy College Renovation
Project Number: H27-6073-AC
Brief Description of Awarded Work, as found on the SE-330, Bid Form: All work shown on the drawings and specifications.

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

Name: JHS Architecture
Address: 1812 Lincoln Street
Columbia, South Carolina 29201

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

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

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

CONTRACTOR

SURETY

By: _____
(Seal)

By: _____
(Seal)

Print Name: _____

Print Name: _____

Print Title: _____

Print Title: _____
(Attach Power of Attorney)

Witness: _____

Witness: _____

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

Labor and Material Payment Bond

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

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

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

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

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

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

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

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

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

13. DEFINITIONS

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

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

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

CONSTRUCTION CHANGE ORDER

Change Order No.:	
--------------------------	--

Agency: University of South Carolina

Project Number: H27-6073-AC

Project Name: Maxcy College Renovation

Contractor:

Contract Dated: _____ For: _____

This Contract is changed as follows: *(Insert description of change in space provided below)*

Adjustments in the Contract Sum:

1. Original Contract Sum: -----		
2. Change in Contract Sum by previously approved Change Orders: -----	<input type="text"/>	
3. Contract Sum prior to this Change Order: -----		<input type="text" value="\$0.00"/>
4. Amount of this Change Order: -----	<input type="text"/>	
5. New Contract Sum, including this Change Order: -----		<input type="text" value="\$0.00"/>

Adjustments in Contract Time:

1. Original Substantial Completion Date: -----		<input type="text"/>
2. Sum of previously approved increases and decreases: -----	<input type="text"/>	Days
3. Changes in Days for this Change Order: -----	<input type="text"/>	Days
4. New Substantial Completion Date: -----		<input type="text"/>

Contractor Acceptance:

BY: _____ Date: _____
(Signature of Representative)
 Print Name: _____

Architect Recommendation for Acceptance:

BY: _____ Date: _____
(Signature of Representative)
 Print Name: _____

Agency Acceptance and Certification

BY: _____ Date: _____
(Signature of Representative)
 Print Name: _____

- Change is within Agency Construction Procurement Certification amount of _____
- Change is not within Agency Construction Procurement Certification amount

Office of the State Engineer Authorization for change not within Agency Construction Procurement Certification:

Signature of OSE Project Manager: _____
 Date: _____

SECTION 01 1000**SUMMARY****PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: Maxcy College Renovations.
- B. Owner's Name: University of South Carolina.
- C. Architect's Name: JHS Architecture: Integrated Design.
- D. The Project consists of the ofreplacement of the existing HVAC system, the upfit of two new faculty suites, four offices, a small classroom, new dining room and a demonstration kitchen. Also included in the work will be the associated plumbing, electrical and minimal structural work. Construction will be preformed while the students are on summer break and the general contractor will have 85 days to complete the work.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on the Cost of the Work plus a fee.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of demolition and removal work is shown on drawings and specified in Section 02 4100.
- B. Scope of alterations work is shown on drawings.
- C. Plumbing: Alter existing system and add new construction, keeping existing in operation.
- D. HVAC: Alter existing system and add new construction, keeping existing in operation.
- E. Electrical Power and Lighting: Alter existing and add new construction.
- F. Fire Alarm: Alter existing system and add new construction, keeping existing in operation.
- G. Telephone: Replace existing system with new construction.
- H. Contractor shall remove and store the following prior to start of work, for later reinstallation by Contractor:
 - 1. GC shall remove, protect and store off site all furniture on the first floor prior to start of work and shall return furniture to the site prior to Substantial Completion. Furniture on the ground floor, second .

1.04 WORK BY OWNER

- A. University of South Carolina will supply the following for installation by Contractor:
 - 1. The owner shall supply the HVAC Fan Coil units and the Outside Air Units and the Contractor shall install and provide full warranty from the manufacturer.
 - 2. The Owner shall supply the operable wall system in the Prefunction Kitchen and the Contractor shall install and provide full warranty from the manufacturer.
 - 3. The Owner shall supply the Doors and frames and all hardware and the Contractor shall install and provide full warranty from the manufacturer.
 - 4. The Owner shall supply the Commercial Kitchen Equipment and the Contractor shall install and provide full warranty from the manufacturer.

1.05 OWNER OCCUPANCY

- A. University of South Carolina intends to occupy the Project upon Substantial Completion.

- B. Cooperate with University of South Carolina to minimize conflict and to facilitate University of South Carolina's operations.
- C. Schedule the Work to accommodate University of South Carolina occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Provide access to and from site as required by law and by University of South Carolina:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Existing building spaces may not be used for storage.
- D. Utility Outages and Shutdown:
 - 1. Limit disruption of utility services to hours the building is unoccupied.
 - 2. Prevent accidental disruption of utility services to other facilities.

1.07 PROJECT SEQUENCE;

- | | |
|---|-------------------------------------|
| A. Notice to Proceed Issued | Early April |
| B. Begin Work on Site | at conclusion of student evacuation |
| C. Substantial Completion | 75 days |
| D. Final Completion | 10 days |
| E. Coordinate construction schedule and operations with University of South Carolina and Architect. | |

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2000**PRICE AND PAYMENT PROCEDURES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Correlation of Contractor submittals based on changes.
- E. Procedures for preparation and submittal of application for final payment.

1.02 RELATED REQUIREMENTS

- A. Section/Document OSE Form 00811 - Standard Supplementary Conditions: Percentage allowances for Contractor's overhead and profit, requirements for progress payments, final payment and changes in the Work.

1.03 SCHEDULE OF VALUES

- A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- B. Forms filled out by hand will not be accepted.
- C. Submit a printed schedule on AIA Form G703 - Application and Certificate for Payment Continuation Sheet. Contractor's standard form or electronic media printout will be considered.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify bonds and insurance.

1.04 APPLICATIONS FOR PROGRESS PAYMENTS

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Present required information in typewritten form.
- E. Form: AIA G702 Application and Certificate for Payment and AIA G703 - Continuation Sheet including continuation sheets when required.
- F. For each item, provide a column for listing each of the following:
 - 1. Item Number.
 - 2. Description of work.
 - 3. Scheduled Values.
 - 4. Previous Applications.
 - 5. Work in Place and Stored Materials under this Application.
 - 6. Authorized Change Orders.
 - 7. Total Completed and Stored to Date of Application.

8. Percentage of Completion.
 9. Balance to Finish.
 10. Retainage.
- G. Execute certification by signature of authorized officer.
- H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.
- I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.
- J. Submit three copies of each Application for Payment.
- K. Include the following with the application:
1. Transmittal letter as specified for Submittals in Section 01 3000.
 2. Construction progress schedule, revised and current as specified in Section 01 3000.
 3. Partial release of liens from major Subcontractors and vendors.
 4. Project record documents as specified in Section 01 7800, for review by University of South Carolina which will be returned to the Contractor.
 5. Affidavits attesting to off-site stored products.
- L. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

1.05 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.
- C. For other required changes, Architect will issue a document signed by University of South Carolina instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 5 days.
- E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.

2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
- G. Substantiation of Costs: Provide full information required for evaluation.
 1. provide following data:
 - a. Quantities of products, labor, and equipment.
 - b. Taxes, insurance, and bonds.
 - c. Overhead and profit.
 - d. Justification for any change in Contract Time.
 - e. Credit for deletions from Contract, similarly documented.
 2. Support each claim for additional costs with additional information:
 - a. Origin and date of claim.
 - b. Time records and wage rates paid.
 - c. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- K. Promptly enter changes in Project Record Documents.

1.06 APPLICATION FOR FINAL PAYMENT

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Record Change Orders on Project Record Drawings maintained at the site, these will be the basis of "As Built" documents.
- C. Application for Final Payment will not be considered until the following have been accomplished:
 1. All closeout procedures specified in Section 01 7000.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preconstruction meeting.
- B. Progress meetings.
- C. Construction progress schedule.
- D. Coordination drawings.
- E. Submittals for review, information, and project closeout.
- F. Number of copies of submittals.
- G. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Document 00 7200 - General Conditions: Dates for applications for payment.
- B. Section 01 1000 - Summary:.
- C. Section 01 7000 - Execution and Closeout Requirements: Additional coordination requirements.
- D. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

- A. Project Coordinator: Contract Administrator for the owner from JHS Architects.
- B. During construction, coordinate use of site and facilities through the Project Coordinator.
- C. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- D. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
- E. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- F. Make the following types of submittals to Architect through the Project Coordinator:
 - 1. Requests for interpretation.
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:
 - 1. University of South Carolina's Representative(s).
 - 2. Architect and/or Contract Administrator.
 - 3. Contractor.
 - 4. Major Subcontractors.
- C. Agenda:
 - 1. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 2. Designation of personnel representing the parties to Contract, _____ and Architect.
 - 3. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 4. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, University of South Carolina, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, University of South Carolina, Architect, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems that impede, or will impede, planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.
 - 11. Maintenance of quality and work standards.
 - 12. Effect of proposed changes on progress schedule and coordination.
 - 13. Change Orders and RFI status.
 - 14. Infection Control reports and issues.
 - 15. Other business relating to Work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, University of South Carolina, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

- C. Within 5 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 5 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Submit updated schedule with each Application for Payment.

3.04 COORDINATION DRAWINGS

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect.

3.05 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
 - 1. Product data.
 - 2. Shop drawings.
 - 3. Samples for selection.
 - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - CLOSEOUT SUBMITTALS.

3.06 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
 - 1. Design data.
 - 2. LEED submittals and reports.
 - 3. Certificates.
 - 4. Test reports.
 - 5. Inspection reports.
 - 6. Manufacturer's instructions.
 - 7. Manufacturer's field reports.
- B. Submit for Architect's knowledge as contract administrator or for University of South Carolina. No action will be taken.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

- A. When the following are specified in individual sections, submit them at project closeout:
 - 1. Project record documents.
 - 2. Operation and maintenance data.
 - 3. Warranties.
 - 4. Bonds.
- B. Submit for University of South Carolina's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Documents for Review:

1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect.
 2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit one reproducible transparency and one opaque reproduction.
- B. Documents for Information: Submit two copies.
- C. Documents for Substantial Completion (as required by SCDHEC and PHA policies).
- D. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.
- E. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

- A. Transmit each submittal with AIA Form G810.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
- E. Deliver submittals to Construction Manager at business address.
- F. Schedule submittals to expedite the Project, and coordinate submission of related items.
- G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
- I. Provide space for Contractor and Architect review stamps.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 3515**LEED REQUIREMENTS****PART 1 GENERAL****1.01 PROJECT GOALS**

- A. This project has been designed to achieve the LEED Certified (minimum 40 points) rating as defined in the LEED(r) Green Building Rating System(tm) for New Construction and Major Renovations, 2009 Edition.
- B. Contractor is not responsible for the application for LEED certification, nor for determination of methods of achieving LEED credits unless specifically so indicated.
- C. Many of the LEED credits can be achieved only through intelligent design of the project and are beyond the control of the Contractor. However, certain credits relate to the products and procedures used for construction. Therefore, the full cooperation of the Contractor and subcontractors is essential to achieving final certification.
- D. Contractor shall familiarize himself with the relevant requirements and provide the necessary information and instruction to all subcontractors and installers.
- E. Since Contractor and subcontractors may not be familiar with LEED requirements, this section includes a summary of the products and procedures intended to achieve LEED credits.
 - 1. Some credits are marked PREREQUISITE; these must be achieved regardless of the level of certification; many are dependent on proper performance by Contractor and subcontractors.
 - 2. Other credits involve quantifying percentages by weight and cost; these require careful recordkeeping and reporting by the Contractor.
 - 3. See www.usgbc.org for more information.

1.02 RELATED AREAS

- A. Areas that include requirements intended to achieve LEED credits include, but are not limited to, the following:
- B. Summary:
 - 1. List of materials and equipment to be salvaged from existing building for re-use or relocation on project; MR Credit 3.
- C. Indoor Air Quality Controls:
 - 1. Testing of air isolation between residential units; EQ PREREQUISITE 2.
 - 2. Testing of ventilation; EQ Credit 2.
 - 3. Contractor's IAQ management plan and construction procedures; EQ Credit 3.1.
 - 4. Building flush out or air contaminant testing; EQ Credit 3.2.
- D. Product Requirements: Overall project requirements for:
 - 1. Recycled content; MR Credits 4.1.
 - 2. Regionally-sourced products; MR Credits 5.1.
 - a. Contractor is not required to provide any particular minimum percentage of regionally-sourced products; however, to collect the information necessary to determine whether these credits can be achieved, Contractor is required to submit the LEED New Product Source Form for every product for which application for payment is made.
- E. Volatile Organic Compound (VOC) Content Restrictions: List of product categories having VOC content restrictions, evidence required, and reporting requirements.

- F. Execution and Closeout Requirements:
 - 1. Dust control and basic surface drainage; SS Prerequisite 1.
 - 2. Alterations procedures and selective demolition for preserving existing construction; MR Credit 1.1 and 1.2.
- G. Construction Waste Management and Disposal:
 - 1. Construction and demolition waste management; MR Credit 2.1 and 2.2.
- H. Closeout Submittals:
 - 1. Maintenance and operation manuals for commissioned systems; EA Credit 3.
- I. Demonstration and Training:
 - 1. Fundamental commissioning; EA PREREQUISITE 1.
 - 2. Demonstration of commissioned systems and training of personnel: EA Credit 3.
- J. General Commissioning Requirements:
 - 1. Fundamental commissioning; EA PREREQUISITE 1.
 - 2. Additional commissioning; EA Credit 3.
- K. Commissioning Authority Responsibilities:
 - 1. Fundamental commissioning; EA PREREQUISITE 1.
 - 2. Additional commissioning; EA Credit 3.
- L. Firestopping: LEED-VOC-compliant firestopping sealants; EQ Credit 4.1.
- M. Joint Sealers: LEED-VOC-compliant sealants; EQ Credit 4.1.
- N. Aluminum-Framed Storefronts:
 - 1. Daylighting; EQ Credit 8.1.
 - 2. Views; EQ Credit 8.2.
- O. Aluminum Windows:
 - 1. Daylighting; EQ Credit 8.1.
 - 2. Views; EQ Credit 8.2.
- P. Glazing:
 - 1. Daylighting; EQ Credit 8.1.
 - 2. Views; EQ Credit 8.2.
- Q. Carpeting: Carpet complying with CRI Green Label Plus requirements and installation materials complying with CRI Green Label requirements; EQ Credit 4.3.
- R. Painting and Coating: LEED-VOC-compliant interior opaque paints and coatings; EQ Credit 4.2.
- S. Fire Protection Specialties: Fire extinguishers that use agents other than Halon: EA Credit 4.
- T. Residential Equipment: Energy Star rated; EA Credit 1.4.
- U. Plumbing Piping:
 - 1. Non-potable water distribution for water use reduction; WE Credit 3.1 and 3.2.
- V. Plumbing Fixtures:
 - 1. Replacement plumbing fixtures; WE PREREQUISITE 1.
- W. Meters and Gages for HVAC Piping:
 - 1. HVAC piping system metering and monitoring devices; EA Credit 5.
- X. Commissioning of HVAC:
 - 1. Fundamental commissioning; EA PREREQUISITE 1.
 - 2. Commissioning of HVAC controls; EQ Credit 7.2.

- Y. Instrumentation and Control Devices for HVAC:
 1. HVAC monitoring and metering devices; EA Credit 5.
 2. For minimum ventilation performance; EQ PREREQUISITE 1.
 3. Outdoor airflow measurement devices in HVAC system; EQ Credit 1.
 4. Carbon dioxide monitoring devices for ventilation control; EQ Credit 1.
 5. Humidity control devices; EQ Credit 1.
- Z. Direct-Digital Control System for HVAC:
 1. For minimum ventilation performance; EQ PREREQUISITE 1.
 2. Individual HVAC controls; EQ Credit 6.2.
 3. Permanent, automatic and operator-adjustable temperature and humidity monitoring; EQ Credit 7.2.
- AA. Hydronic Piping:
 1. Non-potable water distribution for mechanical systems; WE Credit 3.1 and 3.2.
- AB. HVAC Ducts and Casings:
 1. For minimum ventilation performance; EQ PREREQUISITE 1.
 2. Separate ductwork for smoking room(s); EQ PREREQUISITE 2.
 3. Low-VOC duct sealers; MR Credit 3.
 4. Low-VOC duct sealers; EQ Credit 4.1.
 5. Separate ductwork for certain rooms where hazardous gases and chemicals may be present; EQ Credit 5.
 6. For mechanical ventilation for thermal comfort; EQ Credit 7.1.
 7. Separate ductwork for janitor closets; EQ Credit 10.2.
- AC. HVAC Power Ventilators: Exhaust fans:
 1. For minimum ventilation performance; EQ PREREQUISITE 1.
 2. For smoking room(s); EQ PREREQUISITE 2.
 3. For certain rooms where hazardous gases and chemicals may be present; EQ Credit 5.
 4. For mechanical ventilation for thermal comfort; EQ Credit 7.1.
 5. For janitor closets; EQ Credit 10.2.
- AD. Fan Coil Units :
 1. Locally controlled HVAC terminal units; EQ Credit 6.2.
- AE. - HVAC Air Cleaning Devices:
 1. Air filters: EQ Credit 5.
- AF. Wiring Devices: Manual lighting control devices; EQ Credit 6.1.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for additional submittal procedures.
- B. Use of electronic submittal service specified in this section is required.
- C. Submit extra copy of LEED submittals and reports directly to LEED Consultant, as well as to Architect, unless otherwise indicated.
- D. LEED Submittal/Report: For each product with the notation "show quantity on LEED submittal or report," submit a report with the following information:
 1. Submit with each Application for Payment; update the Report each period with latest period shown separately:
 2. Identify each product with:
 - a. Name and manufacturer.
 - b. Specification section number.
 - c. Applicable Credit(s).

- d. Net weight per unit.
 - e. Quantity installed.
 - f. Material cost per unit.
 - g. Total material cost.
3. Attach evidence of compliance from either the manufacturer or an independent agency.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 ELECTRONIC LEED DOCUMENT SUBMITTAL SERVICE

- A. Documents submitted for purposes of LEED certification are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, notifies participants, and provides electronic submission to USGBC.
 1. The types of submittals for which this service must be used include those for credits that relate to materials, and any others designated by Architect.
 2. For credits for which achievement requires substantiation of material type, quantity, and cost, submit receipts showing purchase of materials for this project.
 3. Contractor and Architect are required to use this service.
 4. It is Contractor's responsibility to submit documents in PDF format.
 5. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
 6. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 7. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.
 8. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the contract sum.
- C. Submittal Service: Use one of the following:
 1. GreenGrade (tel: 1-800-714-0024, ext 215): www.greengrade.com.
 2. GreenWizard (tel: 1-843-284-1355): www.greenwizard.com.

END OF SECTION

SECTION 01 4000**QUALITY REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. References and standards.
- B. Quality assurance submittals.
- C. Control of installation.
- D. Tolerances.
- E. Testing and inspection services.
- F. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

- A. Section 01 3000 - Administrative Requirements: (Paragraph 3.09) Submittal procedures.

1.03 SUBMITTALS

- A. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
 - 1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
 - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- B. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, for the University of South Carolina's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- C. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for University of South Carolina.
 - 1. Submit report in duplicate within 15 days of observation to Architect for information.
 - 2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.04 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect 15 days in advance of required observations.
 - 1. Observer subject to approval of Architect.
 - 2. Observer subject to approval of University of South Carolina.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.04 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.

- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 5000**TEMPORARY FACILITIES AND CONTROLS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Temporary telecommunications services.
- B. Existing telephone service.
- C. Existing Fire Pump.
- D. Temporary Controls: Barriers and enclosures.
- E. Security requirements.
- F. Waste removal facilities and services.

1.02 TEMPORARY UTILITIES

- A. Existing facilities may be used.

1.03 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Telephone Land Lines: One line, minimum; one handset per line.
- C. Maintain existing main phone system that is connected to the emergency fire services.

1.04 FIRE PUMP

- A. The existing fire pump must remain in operation throughout the project. Should the fire pump need to be taken off line, a fire watch must be set in place. The University of South Carolina Fire Services must be notified seven (7) days in advance of the fire pump being taken off line.

1.05 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1.06 INTERIOR ENCLOSURES

- A. Provide temporary partitions as indicated to separate work areas from University of South Carolina-occupied areas, to prevent penetration of dust and moisture into University of South Carolina-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:
 - 1. STC rating of 35 in accordance with ASTM E90.
 - 2. Maximum flame spread rating of 75 in accordance with ASTM E84.
- C. Paint surfaces exposed to view from University of South Carolina-occupied areas.

1.07 SECURITY

- A. Provide security and facilities to protect Work, existing facilities, and University of South Carolina's operations from unauthorized entry, vandalism, or theft.

- B. Coordinate with University of South Carolina's security program.

1.08 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site daily.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

1.09 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000**PRODUCT REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Transportation, handling, storage and protection.
- C. Product option requirements.
- D. Substitution limitations and procedures.
- E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 REFERENCE STANDARDS

- A. 16 CFR 260 - Guides for the Use of Environmental Marketing Claims; Federal Trade Commission; current edition.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
 - 1. Submit within 5 days after date of Agreement.
 - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
 - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Unforeseen historic items encountered remain the property of the University of South Carolina; notify University of South Carolina promptly upon discovery; protect, remove, handle, and store as directed by University of South Carolina.

- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the University of South Carolina, or otherwise indicated as to remain the property of the University of South Carolina, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.
- B. Substitutions will not be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to University of South Carolina.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
 - 3. The Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

- A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- B. Transport and handle products in accordance with manufacturer's instructions.
- C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
- F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- H. Prevent contact with material that may cause corrosion, discoloration, or staining.
- I. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- J. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000**EXECUTION AND CLOSEOUT REQUIREMENTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Cleaning and protection.
- E. Starting of systems and equipment.
- F. Demonstration and instruction of University of South Carolina personnel.
- G. Closeout procedures, except payment procedures.
- H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 3000 - Administrative Requirements: (Paragraph 3.09) Submittals procedures.
- C. Section 01 4000 - Quality Requirements: (Paragraph 3.03) Testing and inspection procedures.
- D. Section 01 7800 - Closeout Submittals: (Paragraph 3.01) Project record documents, (Paragraph 3.02-3.05) operation and maintenance data, (Paragraph 3.06) warranties and bonds.
- E. Section 07 8400 - Firestopping.
- F. Individual Product Specification Sections:
 - 1. Advance notification to other sections of openings required in work of those sections.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Include in request:
 - a. Identification of Project.
 - b. Location and description of affected work.
 - c. Necessity for cutting or alteration.
 - d. Description of proposed work and products to be used.
 - e. Alternatives to cutting and patching.
 - f. Date and time work will be executed.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For demolition work, employ a firm specializing in the type of work required.

1. Minimum of 3 years of documented experience.

1.05 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
- D. Pollution Control: Provide methods, means, and facilities to prevent contamination of water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

1.06 COORDINATION

- A. See Section 01 1000 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After University of South Carolina occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of University of South Carolina's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Examine and verify specific conditions described in individual specification sections.
- C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- D. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- E. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Hold a round table meeting with PHB Staff to review schedules and phasing of installation.
- F. Record minutes and distribute copies within two days after meeting to participants, with one copy to Architect, University of South Carolina, participants, and those affected by decisions made.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000.
 - 2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.
- C. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
 - 2. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 - 3. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, and Electrical): Remove, relocate, and extend existing systems to accommodate new construction.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. See Section 01 1000 for other limitations on outages and required notifications.
 - c. Provide temporary connections as required to maintain existing systems in service.
 - 3. Verify that abandoned services serve only abandoned facilities.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- E. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.
- F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
 - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- G. Patching: Where the existing surface is not indicated to be refinished, patch to match the

surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

- H. Refinish existing surfaces as indicated:
 - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
 - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
 - 3. Patch as specified for patching new work.
- I. Clean existing systems and equipment.
- J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- K. Do not begin new construction in alterations areas before demolition is complete.
- L. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-conforming work.
- D. Execute cutting and patching to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.
- E. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.
- J. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous

- surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.
- K. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
- L. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.
- M. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.07 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site daily and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.09 SYSTEM STARTUP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.10 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate operation and maintenance of products to University of South Carolina's personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with University of South Carolina's personnel in detail to explain all aspects of operation and maintenance.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 0593.

3.12 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
 - 1. Clean areas to be occupied by University of South Carolina prior to final completion before University of South Carolina occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces,
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Clean filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, and drainage systems.

- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.
- I. Clean University of South Carolina-occupied areas of work.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect.
 - 2. Provide copies to University of South Carolina.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in Contractor's Notice of Substantial Completion.
- C. Notify Architect when work and documentation is considered ready for Substantial Completion.
- D. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
- E. University of South Carolina will occupy all of the building as specified in Section 01 1000.
- F. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to University of South Carolina-occupied areas.
- G. Accompany Project Coordinator on preliminary final inspection.
- H. Notify Architect when work is considered finally complete.
- I. Complete items of work determined by Architect's final inspection.

3.14 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Furnish service and maintenance of components indicated in specification sections during the warranty period.
- D. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- E. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- F. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the University of South Carolina.

END OF SECTION

SECTION 01 7800**CLOSEOUT SUBMITTALS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

- A. Section 00 7200 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.
- B. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- C. Section 01 7000 - Execution and Closeout Requirements: Contract closeout procedures.
- D. Individual Product Sections: Specific requirements for operation and maintenance data.
- E. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
 - 1. For equipment, or component parts of equipment put into service during construction and operated by University of South Carolina, submit completed documents within ten days after acceptance.
 - 2. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
 - 3. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
 - 1. For equipment or component parts of equipment put into service during construction with University of South Carolina's permission, submit documents within 10 days after acceptance.
 - 2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
 - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED**PART 3 EXECUTION****3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.

3. Addenda.
 4. Change Orders and other modifications to the Contract.
 5. Reviewed shop drawings, product data, and samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by University of South Carolina.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 3. Field changes of dimension and detail.
 4. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

- A. For Each Product, Applied Material, and Finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Additional information as specified in individual product specification sections.
- D. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

- A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.
 2. Identify function, normal operating characteristics, and limiting conditions.
 3. Include performance curves, with engineering data and tests.
 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Include color coded wiring diagrams as installed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:

- a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
- a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Photocopies of warranties and bonds.
- J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.
- K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with University of South Carolina's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.
- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 9113**GENERAL COMMISSIONING REQUIREMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
 - 1. Verify that the work is installed in accordance with the Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
 - 2. Verify and document that functional performance is in accordance with the Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
 - 3. Verify that operation and maintenance manuals submitted to University of South Carolina are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
 - 4. Verify that the University of South Carolina's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

1.02 REFERENCE STANDARDS**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:
 - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Architect; in that case, submit to Architect first.
 - 2. Submit one copy to the Commissioning Authority, not to be returned.
 - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
 - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2003 preferred.
 - 5. As soon as possible after submittals made to Architect are approved, submit copy of approved submittal to the Commissioning Authority.
 - 6. LEED Submittals: Submit approved submittals in accordance with procedures specified in Section 01 3515.
- B. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- C. Product Data: If submittals to Architect do not include the following, submit copies as soon as possible:
 - 1. Manufacturer's product data, cut sheets, and shop drawings.
 - 2. Manufacturer's installation instructions.
 - 3. Startup, operating, and troubleshooting procedures.
 - 4. Fan and pump curves.
 - 5. Factory test reports.
 - 6. Warranty information, including details of University of South Carolina's responsibilities in regard to keeping warranties in force.

- D. Startup Plans and Reports.
- E. Completed Prefunctional Checklists.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of University of South Carolina.
- B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
 - 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
 - 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
 - 3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to University of South Carolina; such equipment, tools, and instruments are to become the property of University of South Carolina.
- D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
 - 1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of University of South Carolina.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

- A. Commissioning Authority has prepared the Commissioning Plan.
 - 1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
 - 2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. Contractor is responsible for compliance with the Commissioning Plan.
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
- D. Commissioning Schedule:
 - 1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
 - 2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
 - 3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
 - 4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Commissioning Authority.

3.03 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
 - 1. No sampling of identical or near-identical items is allowed.
 - 2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
 - 3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
 - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
 - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
 - c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
 - d. Serial number of installed unit.
 - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
 - f. Sensor and actuator calibration information.
- B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
 - 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
 - 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
 - 3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
 - 4. If any Checklist line item is not relevant, record reasons on the form.
 - 5. Contractor may independently perform startup inspections and/or tests, at his option.
 - 6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.
 - 7. Submit completed Checklists to Commissioning Authority within two days of completion.
- C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
 - 1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in the Contract Documents.

2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
 3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in the Contract Documents or not.
 4. When asked to review the proposed Checklists, do so in a timely manner.
- D. Commissioning Authority Witnessing: Required for:
1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
 2. A sampling of non-primary equipment, as allowed by the commissioning plan.
- E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to University of South Carolina.
1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.04 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
- B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
- C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
- D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to University of South Carolina; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.
 2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
 3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
 4. Contractor shall bear the cost of University of South Carolina and Commissioning Authority personnel time witnessing re-testing.
 5. Contractor shall bear the cost of University of South Carolina and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.
- E. Functional Test Procedures:
1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.

2. Examples of Functional Testing:
 - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
 - b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
 - c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
 - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.05 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
- B. Calibrate using the methods described below; alternate methods may be used, if approved by University of South Carolina beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.
- C. All Sensors:
 1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
 2. Verify that sensors with shielded cable are grounded only at one end.
 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
 4. Tolerances for critical applications may be tighter.
- D. Sensors Without Transmitters - Standard Application:
 1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
 3. If not, install offset, calibrate or replace sensor.
- E. Sensors With Transmitters - Standard Application.
 1. Disconnect sensor.
 2. Connect a signal generator in place of sensor.
 3. Connect ammeter in series between transmitter and building automation system control panel.
 4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
 5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
 6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.

7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
 8. Reconnect sensor.
 9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
 10. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
 11. If not, replace sensor and repeat.
 12. For pressure sensors, perform a similar process with a suitable signal generator.
- F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.
 2. Pressure, Air, Water, Gas: 3 percent of design.
 3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.
 4. Relative Humidity: 4 percent of design.
 5. Barometric Pressure: 0.1 inch of Hg.
 6. Flow Rate, Air: 10 percent of design.
 7. Flow Rate, Water: 4 percent of design.
 8. AHU Wet Bulb and Dew Point: 2.0 degrees F.
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
 2. Set pump/fan to normal operating mode.
 3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
 4. Command valve/damper to open; verify position is full open and adjust output signal as required.
 5. Command valve/damper to a few intermediate positions.
 6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
 2. Use an ultra-sonic flow meter to detect flow or leakage.

3.06 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
 2. Sampling is not allowed for:
 - a. Major equipment.

- b. Life-safety-critical equipment.
 - c. Prefunctional Checklist execution.
 3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
 4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
 5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
 6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
 7. If YY percent of the units in the second sample fail, test all remaining identical units.
 8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.
- D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
- F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
- G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
- H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
- I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
 2. Other points will be monitored by the Commissioning Authority using dataloggers.
 3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
 4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
 5. Graphical output is desirable and is required for all output if the system can produce it.
 6. Monitoring may be used to augment manual testing.

3.07 OPERATION AND MAINTENANCE MANUALS

- A. See Section 01 7800 for additional requirements.
- B. Add design intent documentation furnished by Architect to manuals prior to submission to University of South Carolina.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

- D. Commissioning Authority will add commissioning records to manuals after submission to University of South Carolina.

END OF SECTION

SECTION 01 9114**COMMISSIONING AUTHORITY RESPONSIBILITIES****PART 1 GENERAL****1.01 SUMMARY**

- A. Commissioning is intended to achieve the following specific objectives; this section covers the Commissioning Authority's responsibilities for commissioning:
 - 1. Verify that the work is installed in accordance with the Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists are utilized to achieve this.
 - 2. Verify and document that functional performance is in accordance with the Contract Documents: Functional Tests performed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
 - 3. Verify that operation and maintenance manuals submitted to University of South Carolina are complete: Detailed O&M data submittals are specified.
 - 4. Verify that the University of South Carolina's operating personnel are adequately trained: Formal training conducted by Contractor is specified.
- B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Substantial Completion.
- C. Coordinate and direct all the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.

1.02 SCOPE OF COMMISSIONING

- A. The following are to be commissioned:
- B. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

1.03 SUBMITTALS

- A. Commissioning Plan:
 - 1. Submit preliminary draft for review by University of South Carolina and Architect within 30 days after commencement of Commissioning Authority contract.
 - 2. Submit revised draft to be included in the construction contract documents, not less than 4 weeks prior to bid date.
 - 3. Submit final plan not more than 90 days after commencement of construction, for issuance to all parties.
- B. List of Prefunctional Checklists to be developed:
 - 1. Submit preliminary list at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
 - 2. Submit revised list not less than 6 weeks prior to bid date, for inclusion in the construction contract documents.
 - 3. Submit final list not more than 60 days after start of construction.
- C. Prefunctional Checklists:
 - 1. Submit preliminary draft at start of construction documents phase or within 30 days after commencement of contract, whichever is later.

2. Submit revised draft for review by University of South Carolina and Architect not less than 6 weeks prior to bid date, for inclusion in the construction contract documents.
 3. Submit final draft to Contractor not less than 4 weeks prior to startup of particular items to be commissioned.
- D. List of Functional Test procedures to be developed:
1. Submit preliminary list at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
 2. Submit revised list not less than 6 weeks prior to bid date, for inclusion in the Contract Documents; this is intended to be a list of titles, not full description of the tests.
 3. Submit final list not more than 60 days after start of construction.
- E. Functional Test Procedures:
1. Submit preliminary draft at start of construction documents phase or within 30 days after commencement of contract, whichever is later.
 2. Submit revised draft for review by University of South Carolina and Architect not less than 6 weeks prior to bid date, for inclusion in the construction contract documents.
 3. Submit final draft to Contractor not less than 4 weeks prior to startup of particular items to be commissioned.
- F. Training Plan.
- G. Commissioning Record: Submit to Contractor for inclusion with O&M manuals.
- H. Final Commissioning Report: Submit to University of South Carolina.
- I. Recommissioning Manual: Submit within 60 days after receipt of University of South Carolina's instructions to proceed with preparation.

PART 3 EXECUTION

2.01 COMMISSIONING PLAN

- A. Prepare and maintain the Commissioning Plan, covering commissioning schedule, Prefunctional Checklist and Functional Test procedures, coordination requirements, and forms to be used, for all parties in the commissioning process.
1. Call and chair meetings of the Commissioning Team when appropriate.
 2. Give Contractor sufficient notice for scheduling commissioning activities.
 3. Develop a comprehensive start-up and initial systems checkout plan with cooperation of Contractor and subcontractors.
 4. The PECE Model Commissioning Plan may be used as a guide for the Commissioning Plan.
 5. ASHRAE Guideline 1 may be used as a guide for the Commissioning Plan.
 6. Avoid replication of information included in the construction contract documents to the greatest extent possible.
- B. Review the construction contract documents for Contractor submittals of draft checklists, draft test procedures, manufacturer startup procedures, and other information intended for the use of the Commissioning Authority in preparing the Commissioning Plan.
- C. Commissioning Schedule:
1. Coordinate with Contractor anticipated dates of startup of each item of equipment and system.
 2. Contractor's scheduling responsibilities are specified in the construction contract documents.
 3. Revise and re-issue schedule monthly.
 4. Prefunctional Checklists and Functional Tests are to be performed in sequence from

- components, to subsystems, to systems.
5. Deliver relevant Prefunctional Checklists and Functional Test Procedures to Contractor in time to avoid delay.

2.02 CONSTRUCTION CONTRACT DOCUMENTS

- A. General Commissioning Specifications: Architect has prepared general commissioning specifications for inclusion in the construction contract documents; review and submit comments to University of South Carolina.
 1. These specifications include:
 - a. Procedures applicable to all types of items to be commissioned.
 2. Prepare specifications for any of the following that would be recommended, for incorporation into the construction contract documents by Architect:
 - a. Additional Contractor submittals needed for purposes of commissioning, such as startup procedures, draft test procedures, draft training plans, etc.
 - b. Additional University of South Carolina personnel training.
 - c. Additional operation or maintenance data that should be submitted.
- B. Prefunctional Checklists: Develop detailed Checklists for each item to be commissioned.
 1. List of Checklists to be Developed: Prepare and maintain a detailed list of titles, not full text.
 2. The Checklist forms are intended to be part of the Contractor's Contract Documents.
- C. Functional Testing: Develop detailed procedures for each item to be commissioned; submit for review by University of South Carolina and Architect.
 1. List of Test Procedures to be Developed: Prepare and maintain a detailed list of titles, not full text.
 2. The forms the Commissioning Authority will use to report Functional Test results are not intended to be part of Contractor's Contract Documents, but the Functional Test Procedures that must be executed by the Contractor must be made part of the Contract Documents, by modification if necessary.
- D. Develop any other reporting forms Contractor will be required to use; if they are likely to require a substantially different amount of work than the Contractor can reasonably anticipate, they must be included in the construction contract documents.
- E. If any part of the documents described above have not been developed by the bid date, coordinate with Architect the issuance of modifications to the construction contract documents

2.03 PREFUNCTIONAL CHECKLISTS

- A. Prefunctional Checklists - Content: Prepare forms for Contractor's use, in sufficient detail to document that the work has been installed in accordance with the Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup.
 1. Prepare separate Checklists for each type of equipment, system, or other assembly, customized to the item.
 2. Identify each Checklist by using the contract documents identification number or name, if any; if none, create unique identifiers for each Checklist; do not rely on Contractor to number checklists.
 3. Multiple identical or near-identical items may appear on a single Checklist provided there is space to record all required data for each separately; label each set of data uniquely.
 4. Include space to record manufacturer name, model number, serial number, capacity and other relevant characteristics, and accessories and other features as applicable; include space to record "as specified", "as submitted", and "as installed" data.
 5. Include space to record whether or not the required submittals have been received; list

- each separate type of submittal.
6. Include line items for each physical inspection to be performed.
 7. Include line items for each operational inspection to be performed, such as checking switch operation, fan rotation, valve and damper stroke, and measuring actual electrical loads.
 8. Include separate section for sensors and actuators, with space for documenting actual physical location and calibration measurements; provide a separate generic calibration checklist identified wherever referenced.
 9. Include spaces to record that related Checklists for related work upon which this work depends have been completed.
- B. Prefunctional Checklists - Format:
1. Provide a cover sheet showing name of equipment item or system, documentation identification number (see Documentation Identification Scheme), names of accessory components involved, and identification of related checklists.
 2. Include on cover sheet space for Contractor's use in attesting to completeness; provide spaces for the signatures of the general contractor and each subcontractor or other entity responsible, customized to the project and the type of item.
 3. Include on the cover sheet, above the signature block, the following statement: "The work referenced in this Checklist and other work integral to or dependent on this work is complete and ready for functional testing. The checklist items are complete and have been checked off only by parties having direct knowledge of the event." Include two checkboxes:
 - a. "This Checklist is submitted for approval with no exceptions."
 - b. "This Checklist is submitted for approval, subject to the attached list of outstanding items, none of which preclude the performance of safe and reliable functional tests. A statement of completion will be submitted upon completion of the outstanding items."
 4. Use a consistent, tabular format for all Checklists, with one line per checklist activity.
 5. For each line item, provide space for initials and date, and identification of the subcontractor or other entity responsible.

2.04 FUNCTIONAL TEST PROCEDURES

- A. Develop test procedures in sufficient detail to show that functional performance is in accordance with the Contract Documents and shows proper operation through all modes of operation where there is a different system response, including seasonal, unoccupied, warm-up, cool-down, part-and full-load.
1. Obtain assistance and review by installing subcontractors.
 2. Itemize each test sequence in step-by-step order, with acceptance criteria for each step and for the test as a whole.
 3. Include test setup instructions, description of tools and apparatus, special cautions, and.
 4. Avoid procedures that would void or otherwise limit warranties; review with Contractor prior to execution.
 5. For HVAC systems, procedures may include energy management control system trending, stand-alone datalogger monitoring or manual functional testing.
 6. Obtain explicit approval of Contractor in regard to feasibility and safety prior to execution.
- B. Functional Test Report Forms: Prepare forms in advance of testing, using a consistent format; include all test procedure information given to Contractor and:
1. Report Identifier (see Documentation Identification Scheme).
 2. Test prerequisites.
 3. Formulas to be used in calculations.
 4. Yes/No check boxes for each step of test.
 5. Space to record results, document deficiencies, and make recommendations.
 6. Signature and date block for Commissioning Authority.

- C. Functional Test Prerequisites: Include space to verify all of the following items on each Functional Test Report Form, unless truly inapplicable:
1. All related equipment has been started up and start-up reports and Prefunctional Checklists submitted and approved ready for Functional Testing.
 - a. For hydronic systems, check that:
 - 1) Piping system flushing is complete and required report approved.
 - 2) Water treatment system is complete and operational.
 - 3) Test and balance (TAB) is complete and approved.
 2. All control system functions for this and all interlocking systems are programmed and operable in accordance with the Contract Documents, including final set points and schedules with debugging, loop tuning and sensor calibrations completed, with space for signature of controls installer.
 3. Incomplete items identified by Architect during closeout inspections have been corrected or completed.
 4. Safeties and operating ranges have been reviewed.
 5. A copy of the specified sequence of operation is attached.
 6. A copy of applicable schedules and setpoints is attached.
 7. A copy of the specified Functional Test Procedures is attached.
 8. The Functional Test Procedures have been reviewed and approved by the applicable installer.
 9. Vibration control report approved (if required).
 10. False loading equipment, system and procedures ready.
 11. Sufficient clearance around equipment for servicing.
 12. Original values of pre-test setpoints that need to be changed to accommodate testing have been recorded, with a check box provided to verify return to original values (include control parameters, limits, delays, lockouts, schedules, etc.).
 13. Any other items on the Prefunctional Checklist or Start-up Reports that need to be re-verified.

2.05 CONSTRUCTION PHASE

- A. Coordinate the commissioning work with Contractor and Construction Manager, ensure that commissioning activities are being incorporated into the master schedule.
- B. Perform site visits, as necessary, to observe component and system installations. Attend planning and job-site meetings to obtain information on construction progress. Review Contractor's meeting minutes for issues relating to the commissioning process. Assist in resolving discrepancies.
- C. Commissioning Kick-Off Meeting: Plan and conduct a meeting early in the construction phase to review commissioning activities and responsibilities with all parties involved. Require attendance by all members of the Commissioning Team.
- D. Conduct periodic meetings as necessary to coordinate, resolve planning issues, and aid in resolution of deficiencies, minimizing the time spent by Contractor and University of South Carolina personnel; hold meetings at least monthly.
- E. Submit periodic progress reports to University of South Carolina and Contractor.
- F. Review Contractor shop drawing submittals applicable to systems being commissioned for compliance with commissioning needs; verify that University of South Carolina's responsibilities are clearly defined in warranties.
- G. Review and approve submittals directly related to commissioning.

- H. Deliver Prefunctional Checklists and Functional Test procedures to Contractor.
- I. Verify satisfactory completion of Prefunctional Checklists by Contractor by reviewing checklists and by site observation and spot checking; provide formal approval when satisfactory.
- J. Verify startup of all systems by reviewing start-up reports and by site observation; provide formal approval when satisfactory.
- K. Coordinate, witness and approve Functional Tests performed by Contractor. Coordinate retesting until satisfactory performance is achieved.
- L. HVAC Commissioning:
 - 1. Gather and review the control sequences and interlocks and work with Contractor and design engineers until sufficient clarity has been obtained, in writing, to be able to prepare detailed Functional Test procedures.
 - 2. Witness all or part of HVAC piping test and flushing procedures, sufficient to be confident that proper procedures were followed; document testing and include documentation in O&M manuals.
 - 3. Witness all or part of duct testing and cleaning procedures, sufficient to be confident that proper procedures were followed; document testing and include documentation in O&M manuals.
 - 4. Review TAB Plan prepared by Contractor.
 - 5. Before TAB is executed, witness sufficient Functional Testing of the control system to approve it to be used for TAB.
 - 6. Verify air and water systems balancing by spot testing, by reviewing completed reports, and by site observation; provide formal approval when satisfactory.
 - 7. Analyze trend logs and monitoring data to verify performance.
- M. Witness and document testing of systems and components over which the Commissioning Authority does not have direct control, such as smoke control systems, tests contracted directly by University of South Carolina, and tests by manufacturer's personnel; include documentation in O&M manuals.
- N. When Functional Testing for specific systems or equipment is specified to be performed by the Commissioning Authority rather than the Contractor, perform such testing without assistance of Contractor.
- O. Maintain a master deficiency and resolution log and a separate testing record. Provide written progress and test reports with recommended actions.
- P. O&M Data: Review submitted operation and maintenance data for completeness; provide formal approval if satisfactory.
- Q. Notify Contractor and University of South Carolina of deficiencies in procedures or results; suggest solutions.

2.06 TRAINING

- A. Training Plan: Prepare a comprehensive Training Plan, incorporating draft training plans submitted by Contractor.
 - 1. Include a ____ hour session by the HVAC design engineer covering the overall HVAC system and equipment design concepts, with one-line schematic drawings.
 - 2. Include a ____ hour session by the Commissioning Authority on the use of the blank Prefunctional Checklists and Functional Test report forms for re-commissioning purposes.
 - 3. Establish criteria for determining satisfactory completion of training.
- B. Verify that training was satisfactorily completed; provide formal approval if satisfactory.

2.07 CLOSEOUT

- A. Commissioning Record: Use the same format and organization as specified for the O&M manuals.
 - 1. Include the Final Commissioning Plan and Final Report.
 - 2. For each product or system and equipment item, include the following organized as indicated, with separator tabs:
 - a. Design intent documentation, furnished by Architect or others.
 - b. Detailed operational sequences.
 - c. Startup plan and approved startup reports.
 - d. Filled out Prefunctional Checklists.
 - e. Filled out Functional Test reports; trend logs and monitoring reports and analysis; other verification documentation.
 - f. Training plan and training records.
 - g. Recommissioning recommendations, including time schedule and procedures; include blank copies of all Prefunctional Checklists and Functional Test report forms.
- B. Final Commissioning Report: Include:
 - 1. Executive summary.
 - 2. List of participants and roles.
 - 3. Brief facility description.
 - 4. Overview of commissioning scope and general description of testing and verification methods.
 - 5. For each item commissioned, an evaluation of adequacy of:
 - a. The product itself; i.e. compliance with the contract documents.
 - b. Installation.
 - c. Functional performance; include a brief description of the verification method used and observations and conclusions from the testing.
 - d. O&M documentation, including design intent.
 - e. Operator training.
 - 6. List of all outstanding non-compliance items, referenced to the specific functional test, inspection, trend log, etc., where the deficiency is documented.
 - 7. List of unresolved issues, seasonal or deferred testing, and other concerns that could affect facility operation.
 - 8. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. (about four to six pages).
 - 9. Attach appendices containing all commissioning documentation, including logs, minutes, reports, deficiency lists, communications, findings, etc., except that specified to be part of the Commissioning Record.
- C. Recommissioning Manual: Revise the Commissioning Plan documents, checklists, and Functional Test forms as necessary based on accepted recommendations of the final Commissioning Report. Provide step-by-step instructions for recommissioning, blank forms, and cross-references to O&M data needed during recommissioning.

2.08 POST-OCCUPANCY PHASE

- A. Coordinate deferred and seasonal Functional Tests; verify correction of deficiencies.
- B. On-Site Review: 10 months after Substantial Completion conduct on-site review with University of South Carolina's staff.
 - 1. Review the current facility operation and condition of outstanding issues related to the original and seasonal commissioning.
 - 2. Interview staff to identify problems or concerns they have operating the facility as originally intended.

3. Make suggestions for improvements and for recording these changes in the O&M manuals.
4. Identify areas of concern that are still under warranty or are the responsibility of the original construction contractor.
5. Assist facility staff in developing reports, documents and requests for services to remedy outstanding problems.

END OF SECTION

SECTION 02 4100**DEMOLITION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 PROJECT CONDITIONS

- A. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- B. Comply with other requirements specified in Section 01 7000.

PART 2 PRODUCTS -- NOT USED**PART 3 EXECUTION****3.01 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permit.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
 - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from University of South Carolina.
- C. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.

3.02 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as shown.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
 - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.
- C. Remove existing work as indicated and as required to accomplish new work.
 - 1. Remove items indicated on drawings.
- D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- E. Protect existing work to remain.
 - 1. Prevent movement of structure; provide shoring and bracing if necessary.
 - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch as specified for patching new work.

3.03 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 06 1000**ROUGH CARPENTRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Sheathing.
- B. Concealed wood blocking, nailers, and supports.
- C. Miscellaneous wood nailers, furring, and grounds.

1.02 RELATED REQUIREMENTS

- A. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- B. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. AWWA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2010.
- C. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. LEED Submittals: Submit applicable LEED Submittal Form for each different product made of sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, as well as locally-sourced wood, as specified in Section 01 3515.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

- A. Sizes: Nominal sizes as indicated on drawings, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.04 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

2.04 MANUFACTURING

3.01 All products shall be manufactured in the United States of America.

PART 3 EXECUTION

4.01 PREPARATION

- A. Coordinate installation of rough carpentry members specified in other sections.

4.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

4.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

4.04 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 01 7419.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 2000

FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Wood casings and moldings.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 09 9000 - Painting and Coating: Painting and finishing of finish carpentry items.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.
- C. Samples: Submit two samples of finish plywood, 4 x 4 inch in size illustrating wood grain and specified finish.
- D. Samples: Submit two samples of wood trim 4 inch long.

1.05 QUALITY ASSURANCE

- A. Grade materials in accordance with the following:
 - 1. Softwood Lumber: In accordance with rules certified by ALSC; www.alsc.org.
 - 2. Plywood: Certified by the American Plywood Association.
 - 3. Hardwood Lumber: In accordance with NHLA Grading Rules; www.natlhardwood.org.
- B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Premium Grade.
- B. Unless otherwise indicated provide products of quality specified by AWI Architectural Woodwork Quality Standards Illustrated for Premium grade.
- C. All products shall be manufactured in the United States of America.
- D. Interior Woodwork Items:

1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.
2. Window Sills: Clear fir; prepare for transparent finish.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LUMBER MATERIALS

- A. Hardwood Lumber: white oak species, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

2.04 FABRICATION

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWII/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 9000.

3.04 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

SECTION 06 4100**ARCHITECTURAL WOOD CASEWORK****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.

1.02 RELATED REQUIREMENTS

- A. Section 12 3600 - Countertops.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- B. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- C. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 3515.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 PRE-INSTALLATION MEETING

- A. Convene not less than two weeks before starting work of this section.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.08 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS**2.01 CABINETS**

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Premium Grade.

2.02 WOOD-BASED COMPONENTS

- A. Wood fabricated from old growth timber is not permitted.

2.03 LAMINATE MATERIALS

- A. Manufacturers:
 - 1. Formica Corporation: www.formica.com.
 - 2. Wilsonart International, Inc: www.wilsonart.com.
 - 3. Substitutions: Or Approved Equal. See Section 01 6000 - Product Requirements
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications and as indicated.
 - 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
 - 3. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel, or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.05 HARDWARE (Provide hardware that is equal to or better than the following products):

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.
 - 1. Product: Type 255-256 manufactured by Knappe and Vogt Manufacturing Company.
 - 2. Product: Type 798-799 manufactured by Stanley Hardware.
 - 3. Product: Type 12-21 manufactured by Grant Hardware Company.

- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers.
- D. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
- E. Catches: Magnetic.
- F. Drawer Slides:
 - 1. Type: Full extension.
 - 2. Static Load Capacity: Commercial grade.
 - 3. Mounting: Side mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Manufacturers:
 - a. Accuride International, Inc: www.accuride.com.
 - b. Knape & Vogt Manufacturing Company; Product 1483: www.knapeandvogt.com.
- G. Hinges: European style concealed self-closing type, steel with satin finish.
 - 1. Manufacturers:
 - a. Julius Blum, Inc; Product 91A6500 with 170 degree swing: www.blum.com.

2.06 FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Drawer Construction Technique: Dovetail joints.
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 - 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- H. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.
- I. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.

- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 06 4216

WOOD-VENEER PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Custom wood veneer paneling.
- B. Shop finishing.

1.02 RELATED REQUIREMENTS

- A. Section 09 9000 - Painting and Coating: Site finishing of wood veneer faced paneling.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fire retardant treatment materials and application instructions.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
- D. Samples: Submit two samples of finished plywood, 6 x 6 inch in size, illustrating wood grain and specified finish.
- E. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 3515.
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Data for Credit IEQ 4.4: For composite wood products and adhesives, documentation indicating that products contain no urea formaldehyde.
 - 3. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.
- B. Do not deliver wood materials to project site until building is fully enclosed and interior temperature and humidity are in accordance with recommendations of AWII//AWMAC/WI Architectural Woodwork Standards.

PART 2 PRODUCTS

2.01 WOOD-BASED MATERIALS - GENERAL

- A. Wood fabricated from old growth timber is not permitted.

2.02 ACCESSORIES

- A. Lumber for Shimming, Blocking: Softwood lumber of _____ species.

2.03 SHEET MATERIAL

- A. Veneer Faced Plywood Finish: HPVA HP-1; graded in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, core of veneer (wood plies), particleboard, medium density fiberboard, or engineered combination of core materials listed; type of glue recommended for specific application; thickness as required; face veneer as follows:
 - 1. Exposed Surfaces: Grade A, Mahogany, plain sliced, book-matched.

2.04 ADHESIVES AND FASTENERS

- A. Adhesives: Type suitable for intended purpose, complying with applicable air quality regulations.
- B. Fasteners: Of size and type to suit application; plain finish in concealed locations.

2.05 ACCESSORIES

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content
- B. Wood Filler: Tinted to match surface finish color.

2.06 FABRICATION

- A. Fabricate to AWI/AWMAC Quality Standards Illustrated Premium quality, of Flush design.
- B. Fabricate panels with book matching between adjacent leaves.
- C. At panels more than one leaf high, fabricate with continuous sequenced end matching.
- D. Shop prepare and identify panels for grain matching during site erection.
- E. Prepare panels for delivery to site, permitting passage through building openings.
- F. Finish exposed edges of panels as specified by grade requirements.
- G. When necessary to cut and fit on site, provide materials with ample allowance for cutting and scribing.

2.07 SHOP FINISHING

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. Finish work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5 - Finishing for Grade specified and as follows:

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify adequacy of backing and support framing.
- C. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI Architectural Woodwork Standards requirements for grade indicated.
- B. Do not begin installation until wood materials have been fully acclimated to interior conditions.
- C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.

END OF SECTION

SECTION 07 3126

SLATE SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Slate roofing shingles.
- B. Metal roof flashing.

1.02 RELATED REQUIREMENTS

- A. Section 06 1000 - Rough Carpentry: Roof sheathing.
- B. Section 07 6200 - Sheet Metal Flashing and Trim.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on slate roofing, including material characteristics, application limitations, and recommendations for installation.
- C. Shop Drawings: Details for specially configured metal flashing, joint configurations, and flashing locations.
- D. Selection Samples: Actual pieces of slate shingles representing full range of available colors and finishes, for selection by Architect.
- E. Warranty: Submit installer's warranty and ensure that forms have been completed in University of South Carolina's name.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain all slate required for this project from one quarry with adequate resources to assure consistent quality and appearance for the project.
- B. Installer Qualifications: Company specializing in installing slate roofing on historical buildings, with at least 3 years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver shingles to project site in fabricator's unopened crates or cartons, clearly labeled and identified.
- B. Handle shingles to avoid chipping, breakage, soiling, or other damage. Protect edges with wood or other cushioning and protective material.
- C. Stack skids and slate cartons to distribute weight evenly and to avoid breakage or cracking.
- D. Immediately prior to installation, distribute stacked slate shingles on roof to facilitate installation and to avoid overloading roofing substrate.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide warranty against defective materials and workmanship, including related metal flashings, for a period of 10 years after final acceptance. Provide for replacement of defective work at no additional cost to University of South Carolina.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ROOFING MATERIALS

- A. Slate Shingles: To match existing slate shingles.
- B. Slate Shingles: Hard, dense, sound rock, free of ribbons.
 - 1. Classification: Grade S1, expected service life over 75 years, per ASTM C406.
 - 2. Texture: Rough.

2.03 FLASHING MATERIALS

- A. Flashing: As specified in Section 07 6200.

2.04 ACCESSORIES

- A. Nails: Slater's large-headed copper ring shank nails, length not less than twice slate thickness plus 1 inch, or long enough to penetrate completely through roof sheathing.
- B. Metal Ridge and Hip Accessories: As indicated on drawings, same material as exposed flashings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that roofing accessories and roofing penetrations are complete and properly flashed.
- B. Verify that roof openings are correctly framed.
- C. Verify that roof deck surfaces are dry and free of ridges, warping, and voids.

3.02 PREPARATION

- A. Prepare deck surfaces using methods recommended by the shingle manufacturer for achieving the best roofing results under prevalent project conditions.
- B. Broom clean roof deck thoroughly prior to beginning installation.

3.03 INSTALLATION

- A. Install slate shingle roofing system in accordance with recommendations of shingle manufacturer and in accordance with recommendations of NRCA Steep Roofing Manual (MS104).
- B. Underlayment:
 - 1. Install underlayment over entire deck surface. Apply additional layer of underlayment not less than 36 inches wide at valleys.

3.04 PROTECTION

- A. Minimize traffic over finished roof surface. Where absolutely necessary, wear soft-soled shoes and walk on butt of shingles to avoid breakage.
- B. Remove and replace damaged or broken slates before Date of Substantial Completion.

END OF SECTION

SECTION 07 6200**SHEET METAL FLASHING AND TRIM****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, sheet metal roofing, , and other items indicated in Schedule.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples, in size illustrating material of typical standing seam.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

1.05 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.

PART 2 PRODUCTS**2.01 SHEET MATERIALS**

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 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.

2.02 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer: Zinc chromate type.
- C. Protective Backing Paint: Zinc molybdate alkyd.
- D. Sealant: Type specified in Section 07 9005.
- E. Plastic Cement: ASTM D4586, Type I.

2.03 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.04 GUTTER AND DOWNSPOUT FABRICATION

- A. 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.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Secure gutters and downspouts in place using concealed fasteners.

END OF SECTION

SECTION 07 8400**FIRESTOPPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire-resistance rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 REFERENCE STANDARDS

- A. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2009c.
- B. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2009.
- C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- D. FM 4991 - Approval of Firestop Contractors; Factory Mutual Research Corporation; 2001.
- E. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- F. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.
- G. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics.
- C. LEED Report: Submit VOC content documentation for all non-preformed materials.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS**2.01 FIRESTOPPING SYSTEMS**

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 that has F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and that meets all other specified requirements.

2.02 MATERIALS

- A. Firestopping Sealants: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.
- C. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authority having jurisdiction.
- C. Install labelling required by code.

3.04 PROTECTION

- A. Clean adjacent surfaces of firestopping materials.
- B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 9005

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.
- C. Hollow gaskets.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping: Firestopping sealants.

1.03 REFERENCE STANDARDS

- A. ASTM C834 - Standard Specification for Latex Sealants; 2010.
- B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2008.
- C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2010.
- D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2009.
- E. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Poly(Vinyl Chloride) Foam (Closed-Cell); 2005.
- F. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; current edition.
- G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. LEED Report: Submit VOC content documentation for all non-preformed sealants and primers.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.06 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.07 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a two year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal and watertight seal, exhibit loss of adhesion or cohesion, or do not cure, leak, harden, crack, crumble, melt, shrink, run or stain adjacent work.

PART 2 PRODUCTS

2.01 MANUFACTURERS (Provide sealants that are equal to or better than the Manufacturer/Products below):

- A. Silicone Sealants:
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. GE Plastics: www.geplastics.com.
 - 3. Pecora Corporation: www.pecora.com.
 - 4. Tremco Incorporated.
- B. Polyurethane Sealants (Provide sealants that are equal to or better than the Products below):
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. Pecora Corporation: www.pecora.com.
 - 3. Tremco Incorporated.
 - 4. Sonneborne Building Products Div.
- C. Preformed Compressible Foam Sealers (Provide sealants that are equal to or better than the Products below):
 - 1. EMSEAL Joint Systems, Ltd: www.emseal.com.

2.02 SEALANTS

- A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.
- B. Type 1 - General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; single component (Provide sealants that are equal to or better than the Products below):
 - 1. Color: Standard colors matching finished surfaces.
 - 2. Product: Dymeric 511 manufactured by Tremco Inc..
 - 3. Applications: Use for:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.
- C. Type 2 - Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring (Provide sealants that are equal to or better than the Products below):
 - 1. Product: Tremco Butyl Sealant manufactured by Tremco Inc.
 - 2. Applications: Use for:
 - a. Concealed sealant bead in sheet metal work.
 - b. Concealed sealant bead in siding overlaps.
- D. Type 3 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable (Provide sealants that are equal to or better than the Products below):
 - 1. Color: Standard colors matching finished surfaces.
 - 2. Product: Tremco Acrylic Latex 834 manufactured by Tremco Inc..
 - 3. Applications: Use for:

- a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.
- E. Type 4 - Bathtub/Tile Sealant: White silicone; ASTM C920, Uses I, M and A; single component, mildew resistant (Provide sealants that are equal to or better than the Products below):
- 1. Product: Proglaz White manufactured by Tremco Inc.
 - 2. Applications: Use for:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between kitchen and bath countertops and wall surfaces.
- F. Type 5 - Acoustical Sealant for Concealed Locations: Permanently tacky non-hardening butyl sealant (Provide sealants that are equal to or better than the Products below):
- 1. Product: Tremco Acoustical Sealant manufactured by Tremco Inc.
 - 2. Applications: Use for concealed locations only:
 - a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
 - 1. Width/depth ratio of 2:1.
 - 2. Neck dimension no greater than 1/3 of the joint width.
 - 3. Surface bond area on each side not less than 75 percent of joint width.

- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.
- I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.
- J. Compression Gaskets: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION

- A. Protect sealants until cured.

3.06 SCHEDULE

- A. Exterior Joints for Which No Other Sealant Type is Indicated: Type 1; colors as selected.
- B. Interior Joints for Which No Other Sealant is Indicated: Type 3; colors as shown on the drawings.
- C. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type 4.
- D. In STC-Rated Walls, Between Metal Stud Track/Runner and Adjacent Construction: Type 5.

END OF SECTION

SECTION 08 1113**HOLLOW METAL DOORS AND FRAMES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Non-fire-rated steel doors and frames.
- B. Steel frames for wood doors.
- C. Fire-rated steel doors and frames.
- D. Thermally insulated steel doors.
- E. Steel glazing frames.
- F. Accessories, including glazing and louvers.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware.
- B. Section 08 8000 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 9000 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2003.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003.
- C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2004).
- 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 C1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus; 2005.
- F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- G. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.
- H. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; 2000 (ANSI/DHI A115 Series).
- I. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010.
- K. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.
- L. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- M. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

- N. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- O. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.
- D. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store in accordance with NAAMM HMMA 840.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS (Provide Doors and Frames that are equal to or better than the Manufacturer/Products below):

- A. Steel Doors and Frames:
 - 1. Assa Abloy Ceco, Curries, or Fleming: www.assaabloydss.com.
 - 2. Windsor Republic Doors: www.republicdoor.com.
 - 3. Steelcraft; Product : www.steelcraft.com.

2.02 DOORS AND FRAMES

- A. Requirements for All Doors and Frames:
 - 1. Accessibility: Comply with ANSI/ICC A117.1.
 - 2. Door Top Closures: Flush with top of faces and edges.
 - 3. Door Edge Profile: Beveled on both edges.
 - 4. Door Texture: Smooth faces.
 - 5. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
 - 6. Finish: Factory primed, for field finishing.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

- A. Exterior Doors:

1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
 2. Core: Polystyrene foam.
 3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 4. Insulating Value: U-value of 0.70, when tested in accordance with ASTM C1363 _____.
 5. Weatherstripping: Separate, see Section 08 7100.
- B. Interior Doors, Fire-Rated:
1. Grade: ANSI A250.8 Level 2, physical performance Level B, Model 1, full flush.
 2. Fire Rating: As indicated on Door and Frame Schedule, tested in accordance with UL 10C ("positive pressure").
 - a. Provide units listed and labeled by UL.
 - b. Attach fire rating label to each fire rated unit.
- C. Interior Doors:
1. STC Rating of Assembled Door, Frame, and Seals: 35, calculated in accordance with ASTM E413, tested in accordance with ASTM E90 or ASTM E1408.
 2. Core: Polyurethane.
 3. Sound Seals: Integral, concealed in door or frame.
 4. Force to Open and Close and Latch: Not more than 5 pounds.

2.04 STEEL FRAMES

- A. General:
1. Comply with the requirements of grade specified for corresponding door.
 - a. ANSI A250.8 Level 4 Doors: 12 gage frames.
 2. Finish: Factory primed, for field finishing.
 3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- B. Exterior Door Frames: Face welded, seamless with joints filled.
1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
 2. Weatherstripping: Separate, see Section 08 7100.
- C. Interior Door Frames, Non-Fire-Rated: Fully welded type.
- D. Interior Door Frames, Fire-Rated: Fully welded type.
1. Fire Rating: Same as door, labeled.
- E. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

2.05 ACCESSORY MATERIALS

- A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
1. In Fire-Rated Doors: UL-listed fusible link louver, same rating as door.
- B. Glazing: As specified in Section 08 8000, factory installed.
- C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

2.06 FINISH MATERIALS

- A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.
- B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

2.07 MANUFACTURING

- A. A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
- B. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

- A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.
- B. In addition, install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Coordinate installation of hardware.
- E. Coordinate installation of glazing.
- F. Touch up damaged factory finishes.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: As specified in ANSI A250.8.
- B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.
- B. Adjust sound control doors so that seals are fully engaged when door is closed.

3.06 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 08 1416**FLUSH WOOD DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 7100 - Door Hardware.
- C. Section 08 8000 - Glazing.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010.
- D. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.
- E. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- F. WDMA I.S.1-A - Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2004.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Specimen warranty.
- D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special blocking for hardware, factory machining criteria, factory finishing criteria.
- E. Samples: Submit two samples of door veneer, 6x6 inch in size illustrating wood grain, stain color, and sheen.
- F. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 3515.
- G. Manufacturer's Installation Instructions: Indicate special installation instructions.
- H. Warranty, executed in University of South Carolina's name.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- C. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Veneer Faced Door (Provide doors that are equal to or better than the Manufacturer/Products below):
 - 1. Graham Wood Doors: www.grahamdoors.com.
 - 2. Eggers Industries: www.eggersindustries.com.
 - 3. Haley Brothers: www.haleybros.com.
 - 4. Marshfield DoorSystems, Inc: www.marshfielddoors.com.

2.02 DOORS

- A. All Doors: See drawings for locations and additional requirements.
 - 1. Quality Level: Premium Grade, Heavy Duty performance, in accordance with WDMA I.S.1-A.
 - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction and six panel.
 - 1. Provide solid core doors at all locations.
 - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code ("positive pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
 - 3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type staved lumber core (SLC), plies and faces as indicated above.
- B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

- A. Wood Veneer Facing for Transparent Finish: Match veneer and type of finish to existing doors.

2.05 ACCESSORIES

- A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.
- B. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.
- C. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

2.06 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Provide solid blocks at lock edge for hardware reinforcement.
 - 1. Provide solid blocking for other throughbolted hardware.
- D. Fit door edge trim to edge of stiles after applying veneer facing.
- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- G. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

- A. Factory finish doors to match existing finish.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
- D. Use machine tools to cut or drill for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Coordinate installation of glazing.
- G. Install door louvers plumb and level.

3.03 TOLERANCES

- A. Conform to specified quality standard for fit and clearance tolerances.
- B. Conform to specified quality standard for telegraphing, warp, and squareness.
- C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 by 84 inches surface area.
- D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 by 84 inches surface area.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE - See Drawings

END OF SECTION

SECTION 08 3100**ACCESS DOORS AND PANELS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.
- C. Access door and frame units, fire-rated, in wall locations.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of all access door units.

PART 2 PRODUCTS**2.01 ACCESS DOORS AND PANELS**

- A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
- B. Units in Fire Rated Assemblies: Fire rating equivalent to the fire rated assembly in which they are to be installed.
 - 1. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.
 - 2. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated doors.

2.02 WALL AND CEILING UNITS

- A. Manufacturers:
 - 1. Acudor Products Inc; Product ____: www.acudor.com.
 - 2. Karp Associates, Inc; Product ____: www.karpinc.com.
 - 3. Substitutions: Or Approved Equal - See Section 01 6000 - Product Requirements.
- B. Door and Frame Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
 - 1. Material: Steel.
- C. Door and Frame Units: Formed steel.
 - 1. Frames and flanges: 0.058 inch steel.
 - 2. Size: As indicated.
 - 3. Hardware:
 - a. Hinge, Fire-Rated-Units: 175 degree steel hinges with non-removable pin.
 - b. Hinge: Non-Fire-Rated Units: 175 degree steel hinges with removable pin.
 - c. Lock: Screw driver slot for quarter turn cam lock.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings. Secure rigidly in place.
- C. Position units to provide convenient access to the concealed work requiring access.

END OF SECTION

SECTION 08 4110**ALUMINUM WINDOW SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Sliding/folding aluminum and glass door systems.
- B. Factory glazing.
- C. Operating hardware.

1.02 RELATED REQUIREMENTS

- A. Section 07900 (07 9005) - Joint Sealers: Perimeter sealant and back-up materials.

1.03 REFERENCE STANDARDS

- A. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
- B. AAMA 2603, Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- C. AAMA 1304, Voluntary Specifications for Forced Entry Resistance of Side-Hinged Door Systems.
- D. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings.
- E. ASTM E 330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- F. ASTM E 547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
- G. ASTM E 331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- H. ASTM E 1996, Standard Specifications for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.
- I. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.
- J. NFRC 200, Procedure for Determining Solar Heat Gain Coefficient.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 01300 (01 3000) - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, configuration, swing panels, stacking bay layout, typical head jamb, side jamb and sill detail, type of glazing material, and installation requirements.

- D. Samples: Submit two samples, 12 x 12 inch (300 x 300 mm) in size illustrating typical corner construction, accessories, glazing and finishes.
- E. Submit two samples of operating hardware.
- F. Certificates: Certify that windows meet or exceed specified requirements.
- G. Manufacturer's Installation Instructions: Include complete preparation, installation, and cleaning requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in fabrication of commercial aluminum windows of types required, with not fewer than 15 years of experience in folding/sliding door systems for large openings.
- B. Thermal Performance U value: Unit to be rated, certified and labeled in accordance with NFRC 100.
- C. Solar Heat Gain Coefficient: Unit to be rated, certified and labeled in accordance with NFRC 200.
- D. Installer Qualifications : Installer experienced in the installation of manufacturer's products or other similar products for large openings. Installer to provide reference list of at least 3 projects of similar scale completed in the last three years.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. In addition to general delivery, storage and handling requirements specified in Section 01600 comply with the following:
 - 1. Deliver material to jobs site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protect from weather and construction activities.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C).
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.09 WARRANTY

- A. See Section 01780 (01 7800) - Closeout Submittals, for additional warranty requirements.
- B. Provide ten year warranty for rollers and for seal failure of insulated glass supplied. For all other components two years for date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS (Provide Aluminum Window Systems that are equal to or better than the Manufacturer/Products below):

- A. Basis of Design: See below under description of products.
- B. Nana Wall System; Product Nanawall SL25XXL.

2.02 MATERIALS

- A. Frames and Panels: From manufacturer's standard profiles, provide head tracks, stacking bays, side jambs, sliding panels, swing panels, and sliding L frame panels with incorporated swing panels with dimensions shown on drawings.
 - 1. Provide panels with:
 - a. Standard one lite

2. Provide standard bottom rail.
 3. Aluminum Extrusion: Extrusions with nominal thickness of .078" (2.0 mm). Alloy specified as AlMgSi0.5 with strength rated as 6063-T5 or F-22 (European standard). Anodized conforming to AAMA 611, powder coated conforming to AAMA 2603.
 4. Thermally broken with 3/4"-15/16" (20-24 mm) polyamide plastic reinforced with glass fibers with additional insulating foam.
 5. Panels thermally broken with 9/16" (14 mm) Polyamide plastic reinforced with glass fibers. Head jamb thermally enhanced with cover plates on both sides.
 6. Aluminum Finish:
 - a. Clear anodized
- B. Glass:
1. All glass to comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201. Provide manufacturer's standard glass with dry glazing:
 - a. 15/16" (24 mm) insulating clear safety
 2. Provide manufacturer's standard clear anodized glass spacers. Provide with capillary tubes.
 3. All glazing located in a hazardous locations shall be safety glazing and shall meet all requirements of section 2406.4 of the 2009 IBC. See elevation drawings for location of hazardous/safety glazing.
- C. Locking Hardware and Handles:
1. On the sliding panel to be opened first for models without a swing panel, provide manufacturer's standard flat handle on the inside. Operation of lock set is by a two point locking hardware operated by 180° turn of the handle.
 2. On all other secondary panels, provide manufacturer's standard flat handles and concealed two point locking hardware operated by 180 degree turn of handle. Face applied flush bolt locking will not be allowed.
 3. Flat handle finish:
 - a. Stainless steel in a brushed satin finish]
 4. Provide handle height centered at 41 3/8' (or as specified on drawings) from bottom of panel.
 5. Aluminum locking rods with standard (or reinforced to meet higher structural loading) fiber glass reinforced polyamide end caps at top and bottom. Rods to have a stroke of 15/16" (24 mm).
- D. Sliding Hardware: Provide manufacturer's standard hardware.
1. 1. For each sliding panel, provide 2 two wheeled, toughened Polyamide covered stainless steel uni-directional sliding door carriers. Carrying capacity of each carrier to be 220 lbs.
 2. 2. Provide on all four corners of sliding panels, thermally broken, die cast zinc multi-functional corner fittings with carrier connectors, male and female locking receptacles, hinges and hinge pins as required. Finish: Powder coated, closest match to finish of frame and panels.
 3. Adjustment: Provide system capable of specified amount of adjustments without removing panels from tracks.
- E. Other Components:
1. Threshold: Provide
 - a. Clear anodized standard flush sill
 2. Weather stripping: Provide manufacturer's standard double layer APTK at both the inner and outer edge of door panels or on frame for vertical sealing between panels and between panels and frame. Provide brush seals with flexible plastic web for all horizontal sealing.
 3. Provide machine screws for connecting frame components.

2.03 Fabrication

- A. Use extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, glass and glazing and weather stripping as specified herein to make a folding glass wall. Factory pre-assemble as is standard for manufacturer and ship with all components and installation instructions.
 - 1. Sizes and Configurations: See drawings for selected custom dimensions within maximum frame sizes possible as indicated in manufacturer's literature. See drawings for selected number of panels and configuration. Inward [OR outward] opening unit. On configurations with a pair of swing panels, looking from inside, primary swing panel on the left [OR right]
- B. Sizes and Configurations: See drawings for selected number and size of panels, location of swing panels, and location of tracks and stacking bays.

2.04 Accessories

- A. Provide other side lites, transoms, corner posts, or single or double doors as per drawings provided.
- B. Provide the NanaScreen™, a series of vertical, collapsible, pleated screen panels. Provide pleated screen material with floor tracking chain with 1/4" (5 mm) floor track. See drawings for selected number of panels and configuration.
 - 1. Provide aluminum top track, side jambs, and vertical struts:
 - a. NanaScreen™ installation within opening [OR extended beyond opening]

PART 3 - EXECUTION

3.01 Erection

- A. Because of the large dimensions involved and the weight and movement of the panels, verify the structural integrity of the header such that the maximum deflection with live and loads is limited to be the lesser of 1/720 of the span and 1/4". Similar structural support is needed for the stacking bay(s) and any upper track leading to it. Structural support for lateral loads such as wind load must be provided.
- B. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- C. Installation of units constitutes acceptance of existing conditions.

3.02 Installation

- A. Install frame in accordance with manufacturer's recommendations and installation instructions. Properly flash and waterproof around the perimeter of the opening.
- B. Installer to provide anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- C. If necessary, provide drain connections from lower track.
- D. Install panels, handles and lock set in accordance with manufacturer's recommendations and installation instructions.
- E. If necessary, adjust hardware for proper operation.

END OF SECTION

SECTION 08 4313**ALUMINUM-FRAMED STOREFRONTS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of metal and glass.
- C. Aluminum doors and frames.
- D. Weatherstripping.
- E. Door hardware.

1.02 RELATED REQUIREMENTS

- A. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.
- B. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2004.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 1998.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2008.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware,
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Samples: Submit two samples 2 by 3 inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in University of South Carolina's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.07 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Basis of Design: See below under description of products.
- B. Other Acceptable Manufacturers:
 - 1. Kawneer North America: www.kawneer.com.
 - 2. Manko Window Systems, Inc: www.mankowindows.com.
 - 3. United States Aluminum Corp: www.usalum.com.
 - 4. Substitutions: manufacturers listed above or equal.

2.02 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Glazing Position: Centered (front to back).
 - 2. Vertical Mullion Dimensions: 2" x 6".
 - 3. Finish: High performance organic coating.
 - 4. Color: As selected from manufacturer's standards.
 - 5. Basis of Design: YKK AP America Inc; YES 40 FS.

2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
 - 1. Framing members for interior applications need not be thermally broken.
 - 2. Glazing stops: Flush.
- B. Doors: Glazed aluminum.
 - 1. Thickness: 1-3/4 inches.
 - 2. Top Rail: 4 inches wide.
 - 3. Vertical Stiles: 4-1/2 inches wide.
 - 4. Bottom Rail: 6 inches wide.
 - 5. Glazing Stops: Square.
 - 6. Finish: Same as storefront.
 - 7. Basis of Design: YKK AP America Inc; Model 35XT, enerGfacade.

2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glass: As specified in Section 08 8000.

- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.05 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating or AAMA 612 clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mils thick.

2.06 HARDWARE

- A. Door Hardware: Storefront manufacturer's standard type to suit application.
 - 1. Finish on Hand-Contacted Items: Polished chrome.
 - 2. Include for each door weatherstripping, sill sweep strip, threshold, pivots, narrow stile handle latch, and closer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Coordinate attachment and seal of perimeter air and vapor barrier materials.
- I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Set thresholds in bed of mastic and secure.
- K. Install hardware using templates provided.
- L. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.
- M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.04 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by method acceptable to sealant manufacturer.

3.05 PROTECTION

- A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 5113**ALUMINUM WINDOWS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Extruded aluminum windows with fixed sash, operating sash, and infill panels.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

1.02 RELATED REQUIREMENTS

- A. Section 07 9005 - Joint Sealers: Perimeter sealant and back-up materials.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2004.
- B. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2000 (Reapproved 2008).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations,, and installation requirements.
- D. Samples: Submit two samples, 12 x 12 inch in size illustrating typical corner construction, accessories, and finishes.
- E. Submit two samples of operating hardware.

1.05 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Company specializing in fabrication of commercial aluminum windows of types required, with not fewer than three years of experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F.
- B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.08 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 WINDOWS

- A. Windows: Aluminum windows to match existing with size, shape, look, insulated glass, and thermally broken, ect. Window opening size shall meet code for egress.
- B. Windows that are adjacent to walking surfaces and grade shall be considered to be in hazardous areas, and shall meet section 2406 of the 2009 IBC.
- C. Fixed, Non-Operable Type:

2.03 HARDWARE

2.04 FINISHES

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

3.02 INSTALLATION

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.
- G. Install operating hardware not pre-installed by manufacturer.

3.03 TOLERANCES

- A. Maximum Variation from Level or Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

3.04 FIELD QUALITY CONTROL

- A. Test installed windows for compliance with performance requirements for water penetration, in accordance with ASTM E1105 using uniform pressure and the same pressure difference as specified for laboratory testing.
 - 1. If any window fails, test additional windows at Contractor's expense.
- B. Replace windows that have failed field testing and retest until performance is satisfactory.

3.05 ADJUSTING

- A. Adjust hardware for smooth operation and secure weathertight closure.

3.06 CLEANING

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

END OF SECTION

SECTION 08 7100**DOOR HARDWARE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Hardware for wood and hollow steel doors.
- B. Hardware for fire-rated doors.
- C. Thresholds.
- D. Weatherstripping, seals and door gaskets.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames.
- B. Section 08 1416 - Flush Wood Doors.

1.03 REFERENCE STANDARDS

- A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2003.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association, Inc.; 2006 (ANSI/BHMA A156.1).
- C. BHMA A156.2 - American National Standard for Bored and Preamsembled Locks & Latches; Builders Hardware Manufacturers Association; 2003 (ANSI/BHMA A156.2).
- D. BHMA A156.4 - American National Standard for Door Controls - Closers; Builders Hardware Manufacturers Association, Inc.; 2000 (ANSI/BHMA A156.4).
- E. BHMA A156.6 - American National Standard for Architectural Door Trim; Builders Hardware Manufacturers Association; 2005 (ANSI/BHMA A156.6).
- F. BHMA A156.18 - American National Standard for Materials and Finishes; Builders Hardware Manufacturers Association, Inc.; 2006 (ANSI/BHMA A156.18).
- G. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems, Builders Hardware Manufacturers Association; 2005 (ANSI/BHMA A156.22).
- H. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 2004.
- I. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute; 1993; also in WDHS-1/WDHS-5 Series, 1996.
- J. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010.
- K. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 2009.
- L. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
 - 2. Submit manufacturer's parts lists and templates.
- C. Samples: Prior to preparation of hardware schedule:
 - 1. Submit 1 sample of hinge, latchset, lockset, and closer illustrating style, color, and finish.
 - 2. Samples will be returned to supplier.
- D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.
- E. Keying Schedule: New key's to match existing Master Key for Maxcy College. Submit for approval of University of South Carolina.
- F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.
- G. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- H. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- I. Keys: Deliver with identifying tags to University of South Carolina by security shipment direct from hardware supplier.
- J. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in University of South Carolina's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with 3 years of experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.08 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- D. Coordinate University of South Carolina's keying requirements during the course of the Work.

1.09 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide ten year warranty for door closers and five years (mechanical) for exit devices, seven years (mechanical) for locksets. Warranties for the balance of hardware, including electronic components will be 2 years.

1.10 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.11 EXTRA MATERIALS

- A. Provide ten extra key lock cylinders for each master keyed group.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

- A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.
- B. Provide all items of a single type of the same model by the same manufacturer.
- C. Provide products that and comply with the following:
 - 1. Applicable provisions of federal, state, and local codes.
 - 2. Fire-Rated Doors: NFPA 80.
 - 3. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
 - 4. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.
- D. Finishes: All door hardware the same finish unless otherwise indicated.
 - 1. Primary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - 2. Secondary Finish: Satin chrome plated over nickel on brass or bronze, 626 (approx US26D).
 - a. Use secondary finish in kitchens, bathrooms, and other spaces containing chrome or stainless steel finished appliances, fittings, and equipment; provide primary finish on one side of door and secondary finish on other side if necessary.
 - 3. Finish Definitions: BHMA A156.18.
 - 4. Exceptions:
 - a. Where base metal is specified to be different, provide finish that is an appearance equivalent according to BHMA A156.18.
 - b. Hinges for Fire-Rated Doors: Steel base metal with painted finish.

2.02 HINGES

- A. Match existing building hardware through out.
- B. Hinges: Provide hinges on every swinging door.
 - 1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
 - 2. Provide ball-bearing hinges at all doors having closers.
 - 3. Provide hinges in the quantities indicated.
 - 4. Provide non-removable pins on exterior outswinging doors.
 - 5. Where electrified hardware is mounted in door leaf, provide power transfer hinges.

- C. Manufacturers - Hinges: (Provide hinges that are equal to or better than the Manufacturer/Products below):
 1. Assa Abloy McKinney: www.assaabloydss.com.
 2. Stanley Hardware: www.stanleyworks.com.

2.03 PUSH/PULLS

- A. Lock and Latch Sets: ANSI/BHMA 156.13 Series 1000 Grade 1 mortise type with field reversible lock case.
 1. Lock function as indicated in sets.
 2. Keypad function locks and computer managed proximity locks shall be Schlage mortise lock series as scheduled. Lever design and finish to match existing.
 3. Lockset Finish US26D (626).
- B. Push/Pulls: Furnish push plates and pulls as scheduled. At minimum, push plates shall be 8" x 16" x .050" stainless steel.
- C. Push/Pulls: Comply with BHMA A156.6.
 1. Provide push and pull on doors not specified to have lockset, latchset, exit device, or auxiliary lock.
 2. On solid doors, provide matching push plate and pull plate on opposite faces.
- D. Manufacturers - Push/Pulls: (Provide push/pulls that are equal to or better than the Manufacturer/Products below):
 1. Rockwood:

2.04 LOCKS AND LATCHES

- A. Locks: Provide a lock for every door, unless specifically indicated as not requiring locking.
 1. Hardware Sets indicate locking functions required for each door.
 2. If no hardware set is indicated for a swinging door provide an office lockset.
 3. Trim: Provide lever handle or pull trim on outside of all locks unless specifically stated to have no outside trim.
 4. Lock Cylinders: Provide key access on outside of all locks unless specifically stated to have no locking or no outside trim.
- B. Lock Cylinders: Manufacturer's standard tumbler type, six-pin standard core.
 1. Provide cams and/or tailpieces as required for locking devices required.
- C. Keying: The Owner will be providing the Grand Master Keying system. The Keying System is to be Owner Furnished and Contractor installed.
 1. Include construction keying.
 2. Key to the existing keying system.
- D. Latches: Provide a latch for every door that is not required to lock, unless specifically indicated "push/pull" or "not required to latch".

2.05 CLOSERS

- A. Closers: All closers shall be furnished with sex nuts and bolts (SNB).
- B. Closers: Complying with BHMA A156.4.
 1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
 2. Provide a door closer on every exterior door.
 3. Provide a door closer on every fire- and smoke-rated door. Spring hinges are not an acceptable self-closing device unless specifically so indicated.
 4. On pairs of swinging doors, if an overlapping astragal is present, provide coordinator to

ensure the leaves close in proper order.

- C. Manufacturers - Closers: (Provide closers that are equal to or better than the Manufacturer/Products below):
 1. Assa Abloy Corbin Russwin: www.assaabloydss.com.
 2. LCN: www.lcnclosers.com.
 3. Furnish closers complete with arm type as scheduled and special plates and/or brackets required for a complete installation.

2.06 GASKETING AND THRESHOLDS

	Manual Flush Bolts	Constant Latching Flush Bolts	Automatic Flush Bolts	Coordinator
Trimco	3915 or 3913	3820 or 3825		3094
McKinney	FB01M or FB02W	FB07M or FB11W	FB12	CGT1

- A. Gasketing: Generally, unless otherwise scheduled, perimeter gaskets must be provided at all exterior, fire rated, smoke rated and sound reated openings.Furnish door bottom sweep equal to Pemko 315 AN at all new exterior doors.
- B. Gaskets: Complying with BHMA A156.22.
 1. On each door in smoke partition, provide smoke gaskets; top, sides, and meeting stile of pairs. If fire/smoke partitions are not indicated on drawings, provide smoke gaskets on each door identified as a "smoke door" and 20-minute rated fire doors.
 2. On each exterior door, provide weatherstripping gaskets, unless otherwise indicated; top, sides, and meeting stiles of pairs.
 - a. Where exterior door is also required to have fire or smoke rating, provide gaskets functioning as both smoke and weather seals.
 3. On each exterior door, provide door bottom sweep, unless otherwise indicated.
- C. Thresholds:
 1. At each exterior door, provide a threshold unless otherwise indicated.
- D. Manufacturers - Gasketing and Thresholds: (Provide gasketing and thresholds that are equal to or better than the Manufacturer/Products below):
 1. At new hollow metal frames, perimeter gaskets shall be supplied by the frame manufacturer.
 2. Where existing frames are to remain in place furnish Category "S" perimeter gasket equal to Pemko S88 D.
 3. Where existing 45, 60 or 90-minute frames are to remain in place, furnish Category "G"/ Category "H" perimeter gasket (and at meeting stiles of pairs of dorrs) equal to Nation Guard 9850.
 4. Equal products by Pemko, McKinney and National Guard.

2.07 PROTECTION PLATES AND ARCHITECTURAL TRIM

- A. Protection Plates:
 1. Kickplate: Provide on push side of every door with closer, except storefront and all-glass doors.

2.08 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Provide products that comply with the following:
 1. Applicable provisions of Federal, State, and local codes.
 2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and

Facilities.

3. Applicable provisions of NFPA 101, Life Safety Code.
4. Fire-Rated Doors: NFPA 80.
5. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
6. Hardware for Smoke and Draft Control Doors: Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.
7. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
8. All products shall be manufactured in the United States of America.

2.09 KEYING

- A. Door Locks: The Owner will provide the Grand master Keying system. The Keying System will be Owner furnished and Contractor installed.
 1. Include construction keying.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work; labeled, fire-rated doors and frames are present and properly installed, and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available to power operated devices and of the correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Use templates provided by hardware item manufacturer.
- C. Install hardware on fire-rated doors and frames in accordance with code and NFPA 80.
- D. Mounting heights for hardware from finished floor to center line of hardware item:
 1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
 2. For steel doors and frames: See Section 08 1113.
 3. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 4. Wood doors: See Section 08 1416.
- E. Where wall stops are scheduled to be mounted on drywall partitions, provide blocking inside partitions.
- F. Mount exit devices so that rails do not cross door lites except for full glass doors.

3.03 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01 4000.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01 7000.
- B. Adjust hardware for smooth operation.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 01 7000.

B. Do not permit adjacent work to damage hardware or finish.

3.06 SCHEDULE - Attached.

END OF SECTION

HARDWARE SCHEDULE

Note all hardware is to match existing and each door is to match including hinges, lever, strike plate, etc.

HARDWARE SET 1

Exterior door

3 ea. Hinges BB1191 x 4-1/2 x 4-1/2 630
1 ea. Closer 7436 COV AL SN1
1 ea. Lockset Saturn - S51PD-626
3 ea. Silencers GJ64
1 set weatherstripping 5050 x 17 ft.
1 threshold 170A 36" expan.
Secure keyless entry by Sonitrol or equal to match existing

HARDWARE SET 2

Entrance Door

1-1/2 pr. Hinges BB1191 4-1/2 x 4-1/2 630
1 ea. Lockset Saturn - S51PD-626 (to match existing)
1 closer 7436 COV AL SNI
1 door viewer 620 RW 60" AFF
1 door guard 604 X 605 US26D
1 wall stop 409 US32D
3 ea. silencers GJ64

HARDWARE SET 3

Closet

3 ea. Butts (by door supplier - 626 finish)
1 ea. Passage set Schlage (Orbit to match existing)
2 ea. Hinge stop 532NP
1 ea. Base stop 531NP

Bedroom & Bathroom

- 3 ea. Butts (by door supplier - 626 finish)
- 1 ea. Privacy set Schlage (Orbit to match existing)
- 2 ea. Hinge stop 532NP
- 1 ea. Base stop 531NP
- 1 closer 7436 COV AL SNI (at doors 012 and 104 only)

HARDWARE SET 5

Corridor door

- 1-1/2 pr. Hinges BB1191 4-1/2 x 4-1/2 630
- 1 ea. Lockset Saturn - S51PD-626 (to match existing)
- 1 closer 7436 COV AL SNI
- 1 door guard 604 X 605 US26D
- 1 wall stop 409 US32D
- 3 ea. silencers GJ64
- 1 panic hardware Von Duprin series 98-99
- Secure keyless entry by Sonitrol or equal to match existing

HARDWARE SET 6

- Aluminum Storefront Door
- All door hardware by door manufacturer.
- Secure keyless entry by Sonitrol or equal to match existing

HARDWARE SET 7

- Aluminum Storefront Door
- All door hardware by door manufacturer.

HARDWARE SET 8

Corridor door

- 1-1/2 pr. Hinges BB1191 4-1/2 x 4-1/2 630
- 1 ea. Lockset Saturn - S51PD-626 (to match existing)
- 1 closer 7436 COV AL SNI
- 1 door guard 604 X 605 US26D
- 1 wall stop 409 US32D
- 3 ea. silencers GJ64
- Secure keyless entry by Sonitrol or equal to match existing

END OF SECTION 08700

SECTION 08 8000**GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Glass.
- B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 08 1113 - Hollow Metal Doors and Frames: Glazed doors.
- B. Section 08 1416 - Flush Wood Doors: Glazed doors.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005.
- C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2010.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2006.
- E. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 2004.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2009.
- G. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 2009.
- H. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 2008.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Certificates: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Certificate: Certify that sealed insulated glass glass meets or exceeds specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

1.06 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a five (5) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 PRODUCTS

2.01 GLAZING TYPES

- A. Type S-2 - Fire-Rated Safety Glazing:
 - 1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in fire doors.
 - 2. Fire Rating: As indicated on the drawings.
 - 3. Thickness: 1/4 inch.
- B. Type S-3 - Single Safety Glazing: Non-fire-rated.
 - 1. Applications: Provide this type of glazing in the following locations:
 - a. Glazed lites in doors, except fire doors.
 - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
 - c. Other locations required by applicable federal, state, and local codes and regulations.
 - d. Other locations indicated on the drawings.
 - 2. Type: Fully tempered float glass as specified.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch.

2.02 GLASS MATERIALS

- A. Float Glass Manufacturers: Provide glass that are equal to or better than the Manufacturer/Products below:
 - 1. AGC Flat Glass North America, Inc: www.afglass.com.
 - 2. Pilkington North America Inc: www.pilkington.com/na.
 - 3. PPG Industries, Inc: www.ppgglazing.com.
- B. Float Glass: All glazing is to be float glass unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
 - 3. Tinted Types: Color and performance characteristics as indicated.
 - 4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.03 GLAZING COMPOUNDS

- A. Manufacturers: Provide glazing compounds that are equal to or better than the Manufacturer/Products below:
 - 1. Bostik Inc: www.bostik-us.com.
 - 2. GE Plastics: www.geplastics.com.
 - 3. Pecora Corporation: www.pecora.com.
- B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C 920, Type S, Grade NS, Class 25, Uses M, A, and G; cured Shore A hardness of 15 to 25; color as selected.

2.04 GLAZING ACCESSORIES

- A. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; 1x 1 inch size; black color.
- B. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C 864 Option I; black color.
- C. Glazing Clips: Manufacturer's standard type.

2.05 MANUFACTURING

- A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and FGMA Sealant Manual.
- E. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.04 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION 08 8300

MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass and Plastic mirrors.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. LEED Submittals:
 - 1. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.

1.03 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.
- B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS) "Mirrors Handle with Extreme Care: Tips For the Professional on the Care and Handling of Mirrors."

1.04 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors: Provide mirrors that are equal to or better than the Manufacturer/Products below:
 - 1. Arch Aluminum & Glass Co., Inc: www.arch.amarlite.com.
 - 2. Binswanger Mirror/ACI Distribution: www.binswangerglass.com.
 - 3. Lenoir Mirror Co: www.lenoirmirror.com.

2.02 MATERIALS

- A. Mirror Glass - General: Select materials and/or provide supports as required to limit mirrored glass deflection to 1/200 or flexure limit of glass with full recovery of glazing materials, whichever is less.

- B. Mirror Glass: Clear float type with copper and silver coating, organic overcoating, arrised edges, 1/4 inch thick minimum.
 - 1. Sizes noted on Drawings.

2.03 GLAZING ACCESSORIES

- A. Mirror Adhesive:
 - 1. Chemically compatible with mirror coating and wall substrate.
 - 2. Adhesive shall have a VOC content of not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.
- C. Perform installation in accordance with ASTM C1193 for solvent release sealants. Install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install mirrors in accordance with GANA recommendations.
- B. Set mirrors plumb and level, free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Frameless Mirrors: Set mirrors with clips. Anchor rigidly to wall construction.

3.04 CLEANING

- A. Remove wet glazing materials from finish surfaces.
- B. Remove labels after work is complete.
- C. Clean mirrors and adjacent surfaces.

3.05 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION

SECTION.09 2116**GYPSUM BOARD ASSEMBLIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal stud wall framing.
- B. Acoustic insulation.
- C. Gypsum wallboard.
- D. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls.
- B. Section 07 9005 - Joint Sealers: Acoustic sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).
- B. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2009a.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2006.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2009a.
- E. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2008.
- F. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2007.
- G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007.
- H. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2009.
- I. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2009a.
- J. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- K. ASTM E 413 - Classification for Rating Sound Insulation; 2004.
- L. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2010.
- M. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2009.
- N. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.

- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Test Reports: For all stud framing products that do not comply with ASTM C645 or C 754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- D. LEED Submittals:
 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
- B. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
 1. Acoustic Attenuation: STC of 55-59 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.
 1. Fire Rated Partitions: UL listed assembly No. 438; 2 hour rating.
 2. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL Fire Resistance Directory.

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 2. Dietrich Metal Framing: www.dietrichindustries.com.
 3. Marino\Ware: www.marinoware.com.
 4. Telling Industries: www.tellingindustries.com.
 5. Substitutions: Or Approved Equal - See Section 01 6000 - Product Requirements.
- B. Metal Framing Connectors and Accessories:
 1. Same manufacturer as framing.
- C. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 1. Exception: The minimum metal thickness and section properties requirements of ASTM C 645 are waived provided steel of 40 ksi minimum yield strength is used, the metal is continuously dimpled, the effective thickness is at least twice the base metal thickness,

and maximum stud heights are determined by testing in accordance with ASTM E 72 using assemblies specified by ASTM C 754.

2. Studs: "C" shaped with flat or formed webs with knurled faces.
 3. Runners: U shaped, sized to match studs.
 4. Ceiling Channels: C shaped.
 5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging both sides.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board: (Provide gypsum-based board that is equal to or better than the Manufacturer/Products below):
1. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
 2. National Gypsum Company: www.nationalgypsum.com.
 3. USG Corporation: www.usg.com.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
- C. Gypsum Wallboard: ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
1. Regular Type:
 - a. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - b. Thickness: 5/8 inch.
 - c. Edges: Tapered.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness to fill cavity
- B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- C. Finishing Accessories: ASTM C1047, galvanized steel, unless otherwise indicated.
1. Types: As detailed or required for finished appearance.
 2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
- D. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
 2. Ready-mixed vinyl-based joint compound.
- E. High Build Drywall Surfer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.
- F. Screws for Attachment to Steel Members Less Than 0.03 inch In Thickness, to Wood Members, and to Gypsum Board: ASTM C1002; self-piercing tapping type; cadmium-plated for exterior locations.

- G. Screws for Attachment to Steel Members From 0.033 to 0.112 Inch in Thickness: ASTM C954; steel drill screws for application of gypsum board to loadbearing steel studs.
- H. Screws: ASTM C 1002; self-piercing tapping type.
- I. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

2.05 MANUFACTURING

- A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members at 12 inches on center.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, toilet accessories, and hardware. Comply with Section 06 1054 for wood blocking.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place two beads continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Finish all gypsum board in accordance with ASTM C 840 Level 4.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
 - 3. Taping, filling and sanding is not required at base layer of double layer applications.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Spray apply high build drywall surfacer over entire surface after joints have been properly treated to achieve Level 5 finish in areas indicated.
- G. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 3000**TILING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Tile for showers.
- D. Cementitious backer board as tile substrate.
- E. Stone thresholds.
- F. Ceramic accessories.
- G. Ceramic trim.

1.02 REFERENCE STANDARDS

- A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2009.
 - 1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2005.
 - 2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 1999 (R2005).
 - 3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 1999 (R2005).
 - 4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 1999 (R2005).
 - 5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (R2005).
 - 6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (R2005).
 - 7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (R2005).
 - 8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (R2005).
 - 9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (R2005).
 - 10. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999 (R2005).
 - 11. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 1999 (R2005).
 - 12. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (R2005).
 - 13. ANSI A136.1 - American National Standard for Organic Adhesives for Installation of Ceramic Tile; 1999 (R2005).
 - 14. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2008.
- B. TCNA (HB) - Handbook for Ceramic Tile Installation; 2010.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 x 18 inches in size illustrating pattern, color variations, and grout joint size variations.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.
- G. Maintenance Materials: Furnish the following for University of South Carolina's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 2 percent percent of each size, color, and surface finish combination, but not less than two boxes of each type.
- H. LEED Submittal:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of Postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - 2. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
 - 3. Product Data for Credit EQ 4.3: For adhesives and grouts, documentation including printed statement of VOC content.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of The Tile Council of North America Handbook and ANSI A108 Series/A118 Series on site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not install adhesives in an unventilated environment.
- B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

- A. Manufacturers: All products by the same manufacturer. (Provide tile that is equal to or better than the Manufacturer/Products below):
 - 1. American Olean: www.americanolean.com.

2. Dal-Tile Corporation: www.daltile.com.

B. Ceramic Tile: ANSI A137.1 See Finish Schedule for size and color.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
1. Soap Dish: With handle, clam shell design, recess mounted; cast strength sufficient to resist lateral pull force of 75 lbs.
- B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
1. Applications: Use in the following locations:
 - a. Open Edges: Bullnose.
 - b. Inside Corners: Jointed.
 - c. Floor to Wall Joints: Cove base.
 2. Manufacturer: Same as for tile.
- C. Thresholds: Marble, white or gray, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

2.03 ADHESIVE MATERIALS

- A. Manufacturers: Provide adhesive material that is equal to or better than the Manufacturer/Products below:
1. Bonsal American, Inc: www.prospec.com.
 2. Bonsal American, Inc; StayFlex 590: www.prospec.com
 3. Bostik Inc: www.bostik-us.com.
 4. Mapei Corporation: www.mapei.com.
- B. Organic Adhesive: ANSI A136.1, thinset bond type; use Type I in areas subject to prolonged moisture exposure.
- C. Epoxy Adhesive: ANSI A118.3,, thinset bond type.
- D. Tile Setting Adhesive: Elastomeric, waterproof, liquid applied, .

2.04 MORTAR MATERIALS

- A. Manufacturers: Provide mortar material that is equal to or better than the Manufacturer/Products below:
1. Bonsal American, Inc: www.prospec.com.
 2. Bostik Inc: www.bostik-us.com.
 3. Custom Building Products: www.custombuildingproducts.com.
- B. Mortar Bond Coat Materials:
1. Epoxy: ANSI A118.3.

2.05 GROUT MATERIALS

- A. Manufacturers: Provide grout that is equal to or better than the Manufacturer/Products below:
1. Bonsal American, Inc: www.prospec.com.
 2. Bonsal: www.bonsal.com.
 3. Custom Building Products: www.custombuildingproducts.com.
 4. LATICRETE International, Inc: www.laticrete.com.

- B. Grout: 100% Solid Epoxy Grout ANSI A118.3; with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)..
 - 1. Colors: As shown on the drawings.

2.06 ACCESSORY MATERIALS

- A. Waterproofing Membrane at showers: Specifically designed for bonding to cementitious substrate for thin-set tile installation; complying with ANSI A118.10.
 - 1. Material:
 - a. Polyethylene sheet membrane with polypropylene fleece laminated to both sides, 0.008 inch, thick, minimum.
 - 2. Shower Tray; 2.75 lb/cubic ft density expanded polystyrene.
 - 3. Drain Assembly; manufacturer's standard drain with bonding flange. Include grate assembly and associated accessories.
 - 4. Manufacturers: Provide waterproofing membrane that is equal to or better than the Manufacturer/Products below:
 - a. Schluter "KERDI" Shower System.
 - b. Substitutions: See Section 01 6000 - Product Requirements.
- B. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge.
- E. Install tile backer board in strict accordance with manufacturer's instructions, using galvanized roofing nails or corrosion-resistant bugle head drywall screws. Bed fiberglass self-adhesive tape at all joints and corners with material used to set tiles.

3.03 INSTALLATION - GENERAL

- A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and The Tile Council of North America Handbook recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install ceramic accessories rigidly in prepared openings.
- G. Install thresholds where indicated.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- J. Allow tile to set for a minimum of 48 hours prior to grouting.
- K. Grout tile joints. Use standard grout unless otherwise indicated.
- L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
- B. Over wood substrates, install in accordance with The Tile Council of North America Handbook Method F142, with standard grout, unless otherwise indicated.
 - 1. Where epoxy bond coat and grout are indicated, install in accordance with The Tile Council of North America Handbook Method F143.
- C. Over wood substrate with backer board underlayment, install in accordance with The Tile Council of North America Handbook Method F144, for cementitious backer boards, with standard grout.

3.05 INSTALLATION - SHOWERS

- A. At tiled shower receptors install in accordance with TCNA Handbook Method B421 similar; use manufacturer's fabricated sloped tray in lieu of mortar bed, and W244C, thin-set over cementitious backer unit with membrane on walls.
- B. Grout with standard grout as specified above.
- C. Grout with standard grout as specified above.
- D. Seal joints between tile work and other work with sealant Type 4 specified in Section 07 9005.

3.06 INSTALLATION - WALL TILE

- A. Over cementitious backer units install in accordance with The Tile Council of North America Handbook Method W223, organic adhesive.
- B. Over interior concrete and masonry install in accordance with The Tile Council of North America Handbook Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.07 CLEANING

- A. Clean tile and grout surfaces.

3.08 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION

SECTION 09 5100**ACOUSTICAL CEILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED REQUIREMENTS

- A. Section 28 3100 - Fire Detection and Alarm: Fire alarm components in ceiling system.
- B. Section 23 3000 - HVAC Air Distribution: Air diffusion devices in ceiling.
- C. Section 26 5100 - Interior Lighting: Light fixtures in ceiling system.

1.03 REFERENCE STANDARDS

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2009b.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.
- C. ASTM E 580/E 580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2009a.
- D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 2008.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components.
- C. Samples: Submit two samples 4 x 4 inch in size illustrating material and finish of acoustical units.
- D. Samples: Submit two samples each, 8" long, of suspension system main runner.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. LEED Submittal: Documentation of recycled content and location of manufacture.
 - 1. Provide 100 sq ft of each type of acoustical unit for University of South Carolina's use in maintenance of project.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Provide 5 percent of total acoustical unit area of each type of acoustical unit for University of South Carolina's use in maintenance of project.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers: Provide acoustical units that are equal to or better than the Manufacturer/Products below:
 - 1. Match building standard.
 - 2. Armstrong World Industries, Inc: www.armstrong.com.
 - 3. USG: www.usg.com.
- B. Acoustical Units - General: ASTM E1264, Class A.
- C. Acoustical Panels: Match existing.
 - 1. Size: 24 x 24 inches.
 - 2. Panel Edge: Square.
 - 3. Surface Pattern: Perforated.
 - 4. Surface Color: White.
 - 5. Suspension System: Match existing Exposed grid.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers: (Provide suspension system that is equal to or better than the Manufacturer/Products below):
 - 1. Match existing suspension system.
 - 2. Armstrong World Industries, Inc: www.armstrong.com.
 - 3. USG; Product : www.usg.com.
- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required by seismic Class "D" code. System shall also conform to CISCA Seismic class D requirements which include ASCE 7 per chapter 26, Section 2506.2.1.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Acoustical Sealant For Perimeter Moldings: Specified in Section 07 9005.

- D. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.
- E. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section. System shall also conform to CISCA Seismic class D requirements which include ASCE 7 per chapter 26, Section 2506.2.1.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Use longest practical lengths.
 - 2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 6429**WOOD STRIP AND PLANK FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wood strip and plank flooring, nailed.

1.02 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for flooring.
- C. Shop Drawings: Indicate floor joint pattern and termination details.
 - 1. Indicate provisions for expansion and contraction.
 - 2. Indicate location, size, design, and color of game markings.
- D. Samples: Submit two samples of a standard plank size illustrating floor finish, color, and sheen.
- E. Installation Instructions: Indicate standard and special installation procedures.
- F. Maintenance Data: Include maintenance procedures.
- G. Maintenance Materials: Furnish the following for University of South Carolina's use in maintenance of project.
 - 1. See Section 01 6000 - Product Requirements, for additional provisions.
 - 2. Extra Flooring Material: 10 square yards matching installed flooring.
- H. LEED Submittal: Documentation of recycled content and location of manufacture.

1.03 QUALITY ASSURANCE

- A. Perform work of this section in accordance with MFMA (SPEC).
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing work of this section with minimum five years experience.

1.04 FIELD CONDITIONS

- A. Do not install wood flooring until wet construction work is complete and ambient air at installation space has moisture content stabilized at maximum moisture content of 40 percent.
- B. Provide heat, light, and ventilation prior to installation.
- C. Store materials in area of installation for minimum period of 24 hours prior to installation.
- D. Maintain minimum room temperature of 65 degrees F for a period of two days prior to delivery of materials to installation space, during installation, and after installation.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Hardwood Flooring: (Provide hardwood flooring that is equal to or better than the Manufacturer/Products below):
 - 1. Armstrong World Industries, Inc: www.armstrong.com.

2.02 MATERIALS

- A. Wood Strip Flooring - Type see finish schedule:
 - 1. Species: see finish schedule.
 - 2. Grade: First.
 - 3. Cut: Flat grain.
 - 4. Edge: Square.
 - 5. End: End matched.
 - 6. Length: Random, minimum of 9 inches.

2.03 ACCESSORIES

- A. Floor Finish: Specified in Section 09 9000.
- B. Sealer and Wax: Types recommended by flooring manufacturer.

2.04 SOURCE QUALITY CONTROL

- A. Inspect and stamp species and grade on underside of each piece of wood flooring at factory.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet.
- C. Verify wood subfloor is properly secured, smooth and flat to plus or minus 1/4 inch in 10 feet.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare substrate to receive wood flooring in accordance with manufacturer's, MFMA, and NOFMA instructions.
- B. Broom clean substrate.

3.03 INSTALLATION

- A. Sheathing Paper: Place over wood subfloor; lap edges and ends 2 inches, staple in place.
- B. Wood Flooring:
 - 1. Install in accordance with manufacturer's, MFMA, and NOFMA instructions; predrill and blind nail to sleepers.
 - 2. Lay flooring parallel to length of room areas. Verify alignment as work progresses.
 - 3. Arrange flooring with end matched grain set flush and tight.
 - 4. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar; provide divider strips and transition strips in accordance with flooring manufacturer's recommendations and as indicated..
 - 5. Install edge strips at unprotected or exposed edges, and where flooring terminates.
 - 6. Secure edge strips before installation of flooring with stainless steel screws.
 - 7. Install flooring tight to floor access covers.
 - 8. Provide 1/4" inch expansion space at fixed walls and other interruptions.
- C. Finishing:
 - 1. Mask off adjacent surfaces before beginning sanding.
 - 2. Sand flooring to smooth even finish with no evidence of sander marks. Take precautions to contain dust. Remove dust by vacuum.
 - 3. Apply finish in accordance with floor finish manufacturer's instructions.

4. Apply first coat, allow to dry, then buff lightly with steel wool to remove irregularities. Vacuum clean and wipe with damp cloth before applying succeeding coat.
5. Lightly buff between coats with steel wool and vacuum clean before applying succeeding coat.
6. Apply last coat of finish.

3.04 CLEANING

- A. Clean and polish floor surfaces in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Place protective coverings over finished floors; do not remove coverings until Substantial Completion.

END OF SECTION

SECTION 09 6500**RESILIENT FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Resilient stair accessories.
- D. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2009a.
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2008.
- C. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; 2004.
- D. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 2004 (Reapproved 2009).
- E. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008.
- F. ASTM F 1913 - Standard Specification for Vinyl Sheet Floor Covering Without Backing; 2004.
- G. FS RR-T-650 - Treads, Metallic and Nonmetallic, Skid Resistant; Federal Specifications and Standards; Revision E, 1994.
- H. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Verification Samples: Submit two samples, 4x4 inch in size illustrating color and pattern for each resilient flooring product specified.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- E. LEED Report: Report recycled content and VOC emission of flooring; VOC content of adhesives.
- F. LEED Submittal: Documentation of recycled content and location of manufacture.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect roll materials from damage by storing on end.

1.05 FIELD CONDITIONS

- A. Maintain temperature in storage area between 65 degrees F and 100 degrees F.

- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.06 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional provisions.
- B. Provide 100 sq ft of flooring, 100 lineal feet of base, and 5 percent of installed stair materials of each type and color specified.

PART 2 PRODUCTS

2.01 TILE FLOORING

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness. (Provide vinyl composition tile that is equal to or better than the Manufacturer/Products below):
 - 1. Minimum Requirements: Comply with ASTM F 1700, of Class corresponding to type specified.
 - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 3. Size: 12 x 12 inch.
 - 4. Thickness: 0.125 inch.
 - 5. Pattern: Marbleized.
 - 6. Manufacturers:
 - a. Armstrong World Industries, Inc; Product : www.armstrong.com.
 - b. Mannington Mills, Inc; Product Essentials: www.mannington.com.
 - c. Substitutions: Or Approved Equal - See Section 01 6000 - Product Requirements.

2.02 STAIR COVERING

- A. Stair Treads: Provide stair treads that are equal to or better than the Manufacturer/Products below:
 - 1. Rubber; full width and depth of stair tread in one piece; tapered thickness; nosing not less than 1-5/8 inch deep.
 - 2. Minimum Requirements: Comply with FS RR-T-650 requirements corresponding to type specified.
 - 3. Nominal Thickness: 0.1875 inch.
 - 4. Nosing: Square.
 - 5. Style: Contrasting color abrasive grit strips full width.
 - 6. Color: Solid.
 - 7. Manufacturers:
 - a. Johnsonite, Inc: www.johnsonite.com.
 - b. Substitutions: Or Approved Equal - See Section 01 6000 - Product Requirements.
- B. Stair Risers: Provide stair risers that are equal to or better than the Manufacturer/Products below:
 - 1. Full height and width of tread in one piece, matching treads in material and color:
 - 2. Thickness: 0.080 inch.
 - 3. Manufacturers:
 - a. Johnsonite, Inc: www.johnsonite.com.
 - b. Substitutions: Or Approved Equal - See Section 01 6000 - Product Requirements.

2.03 RESILIENT BASE

- A. Resilient Base: Provide Resilient Base that is equal to or better than the Manufacturer/Products below:

- B. Resilient Base: ASTM F1861; Type TS rubber, vulcanized thermoset; top set Style B, Cove, and as follows:
 - 1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 - 2. Height: 4 inch.
 - 3. Thickness: 0.125 inch thick.
 - 4. Finish: Satin.
 - 5. Finish: The base shall have a Class "C" finish or higher
 - 6. Length: Roll.
 - 7. Color: Color as selected from manufacturer's standards.
 - 8. Manufacturers:
 - a. Johnsonite, Inc: www.johnsonite.com.

2.04 ACCESSORIES

- A. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.
- B. Moldings, Transition and Edge Strips: Metal.
- C. Filler for Coved Base: Plastic.

2.05 MANUFACTURING

- A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.
- C. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- D. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.
- E. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- F. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.
- B. Prohibit traffic until filler is cured.
- C. Clean substrate.
- D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances

that cannot be removed.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 TILE FLOORING

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place, press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Before installation of flooring, secure metal strips with stainless steel screws.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Install flooring in recessed floor access covers. Maintain floor pattern.
- J. Caulk at all door frames and unsealed joints that abutt a different material.

3.05 RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces. If base is not attached tightly to the wall during installation- the perimeter will be caulked.
- D. Scribe and fit to door frames and other interruptions. Caulk at door frame.

3.06 STAIR COVERINGS

- A. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's instructions.
- C. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions.

3.08 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 6800**CARPETING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Carpet, direct-glued.
- B. Removal of existing carpet.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006.
- B. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2009a.
- C. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2009.
- D. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; current edition.
- E. CRI (GLP) - Green Label Plus Carpet Testing Program - Approved Products; Carpet and Rug Institute; current edition.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two samples 6x6 inch in size illustrating color and pattern for each carpet material specified.
- D. LEED Report:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - 2. Product Data for Credit EQ 4.1: For installation adhesive, documentation including printed statement of VOC content.
 - 3. Product Data for Credit EQ 4.3: For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
- E. Manufacturer's Installation Instructions: Indicate special procedures.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet with minimum three years documented experience.

- B. Installer Qualifications: Company specializing in installing carpet with minimum three years experience.

1.05 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.
- B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.
- C. Ventilate installation area during installation and for 72 hours after installation.

1.06 EXTRA MATERIALS

- A. See Section 01 6000 - Product Requirements, for additional requirements.
- B. Provide 5% of carpeting of each type, color, and pattern specified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carpet: Provide Carpet that is equal to or better than the Manufacturer/Products listed on the finish schedule and stated below:
 - 1. See Finish Schedule for Carpet Manufacturer and Product

2.02 CARPET

- A. Carpet Type see drawings:
 - 1. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 2. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 3. VOC Content: Provide CRI Green Label Plus certified product; in lieu of labeling, independent test report showing compliance is acceptable.

2.03 ACCESSORIES

- A. Sub-Floor Filler: Type recommended by carpet manufacturer.
- B. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.
- C. Moldings and Edge Strips: Embossed Aluminum at Lobby Areas, Rubber (T) shape at Dorm Rooms and Corridors; color as selected.
- D. Adhesives - General: Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- E. Seam Adhesive: Recommended by manufacturer.
- F. Contact Adhesive: Compatible with carpet material; releasable type.

2.04 MANUFACTURING

- A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive carpet.

- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesives to sub floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for carpet installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove existing carpet and carpet cushion.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet and cushion in accordance with manufacturer's instructions and CRI Carpet Installation Standard.
- C. Verify carpet match before cutting to ensure minimal variation between dye lots.
- D. Lay out carpet:
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- E. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

3.04 DIRECT-GLUED CARPET

- A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.
- B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.
- C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
- D. Roll with appropriate roller for complete contact of adhesive to carpet backing.
- E. Trim carpet neatly at walls and around interruptions.

- F. Complete installation of edge strips; concealing exposed edges. Bind cut edges where not concealed by edge strips.

3.05 CLEANING

- A. Remove excess adhesive from floor and wall surfaces without damage.
- B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 9000**PAINTING AND COATING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Floors, unless specifically so indicated.
 - 6. Glass.
 - 7. Concealed pipes, ducts, and conduits.
- D. Painting materials and methods for conduit identification specified in Section 26 0553.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2008.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- D. GreenSeal GS-11 - Paints; 1993.

1.03 DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this section.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on all finishing products, including VOC content.
- C. Samples: Submit two paper chip samples, 6x6 inch in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- E. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- F. LEED Report: VOC content of all interior opaque coatings actually used.
- G. Manufacturer's Instructions: Indicate special surface preparation procedures.

- H. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.
- B. Paints: Provide paints that are equal to or better than the Manufacturer/Products below:
 - 1. Porter Paints.
 - 2. Sherwin Williams Paints
 - 3. Rose Talbert Paints.
- C. Primer Sealers:

2.02 PAINTS AND COATINGS - GENERAL

- A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
 - 1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 2. Supply each coating material in quantity required to complete entire project's work from a single production run.

3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
- B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
- C. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- D. Chemical Content: The following compounds are prohibited:
1. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint WI-TR-VS - Wood, Transparent, Varnish, Stain:
1. One coat of stain; match to sample provided.
 2. One coat sealer; polyurethane.
- B. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
1. One coat of block filler.
 2. Flat: Two coats of latex enamel; as scheduled.
- C. Paint MI-OP-2A - Ferrous Metals, Primed, Alkyd, 2 Coat:
1. Touch-up with alkyd primer.
 2. Semi-gloss: Two coats of alkyd enamel.
- D. Paint Mgl-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
 2. Semi-gloss: Two coats of alkyd enamel.
- E. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. See finish schedule in drawings for requirements.
 2. One coat of alkyd primer sealer.
 3. Eggshell: Two coats of latex enamel.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Gypsum Wallboard: 12 percent.
 - 2. Plaster and Stucco: 12 percent.
 - 3. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
 - 4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to coating application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Plaster Surfaces to be Painted: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- J. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.

- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Refer to Section 22 0553 and Section 26 0553 for schedule of color coding of equipment, duct work, piping, and conduit.
- B. Paint shop-primed equipment, where indicated.
- C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- D. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

- A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.06 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.07 PROTECTION

- A. Protect finished coatings until completion of project.
- B. Touch-up damaged coatings after Substantial Completion.

3.08 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
 - 1. Items fully factory-finished unless specifically noted.
 - 2. Fire rating labels, equipment serial number and capacity labels.
 - 3. Stainless steel items.
- B. Paint the surfaces described below under Schedule - Paint Systems.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
 - 1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
 - 2. Paint shop-primed items occurring in finished areas.
 - 3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 - 4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

END OF SECTION

SECTION 10 4400**FIRE PROTECTION SPECIALTIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. NFPA 10 - Standard for Portable Fire Extinguishers; 2010.
- B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS**2.01 MANUFACTURERS**

- A. Fire Extinguishers, Cabinets and Accessories: Provide Fire Extinguishers, cabinets, and accessories that are equal to or better than the Manufacturer/Products below:
 - 1. JL Industries, Inc: www.jlindustries.com.
 - 2. Larsen's Manufacturing Co: www.larsensmfg.com.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL for the purpose specified and indicated.
 - 2. Install as indicated on Contract Documents/Drawings.
- B. FE-36 Type Fire Extinguishers: Stainless steel tank, with pressure gage.
 - 1. Class: A:B:C.
 - 2. Size: 2.5 pound.
 - 3. Size and classification as scheduled.
 - 4. Finish: Baked polyester powder coat, red color.

2.03 FIRE EXTINGUISHER CABINETS

- A. Metal: Formed primed steel sheet; 0.036 inch thick base metal.

- B. Cabinet Configuration: Recessed type.
 - 1. Sized to accommodate accessories.
 - 2. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.
- C. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with two butt hinge. Provide nylon catch.
- D. Door Glazing: Plastic, clear, 1/8 inch thick acrylic. Set in resilient channel gasket glazing.
- E. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.
- F. Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: Primed for field paint finish.
- H. Finish of Cabinet Interior: White enamel.

2.04 MANUFACTURING

- A. All products shall be manufactured in the United States of America.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 11 3100**RESIDENTIAL APPLIANCES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Kitchen appliances.
- B. Laundry appliances.

1.02 REFERENCE STANDARDS

- A. UL (EAUED) - Electrical Appliance and Utilization Equipment Directory; Underwriters Laboratories Inc.; current edition.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in University of South Carolina's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Electric Appliances: Listed and labeled by UL and complying with NEMA standards.

1.05 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.
- C. Provide ten (10) year manufacturer warranty on magnetron tube of microwave ovens.
- D. Provide ten (10) year manufacturer warranty on tub and door liner of dishwashers.

PART 2 PRODUCTS**2.01 KITCHEN APPLIANCES**

- A. All Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Provide appliances that are equal to or better than the Manufacturer/Products below:
- C. Refrigerator: Free-standing, side-by-side, frost-free.
 - 1. Capacity: Total minimum storage of 16.5 cubic ft; minimum 20 percent freezer capacity.
 - 2. Energy Usage: Minimum 20 percent more energy efficient than energy efficiency standards set by DOE.
 - 3. Features: Include automatic icemaker and light in freezer compartment.
 - 4. Finish: Porcelain enameled steel, color as indicated.
 - 5. Manufacturers:
 - a. GE Appliances; Product GTJ17BCCSA: www.geappliances.com.
- D. Range: Electric, drop-in, with glass-ceramic cooktop.
 - 1. Size: 30 inches.

2. Oven: Self-cleaning with electronic ignition.
 3. Elements: 4.
 4. Controls: Push-to-turn knobs with electronic clock and timer.
 5. Features: Include automatic meat thermometer, storage drawer, oven door window, broiler pan and grid, and oven light.
 6. Finish: Porcelain enameled steel, color white.
 7. Manufacturers:
 - a. GE Appliances; Product JBP35MWW: www.geappliances.com.
 8. Range shall have an exhaust hood as listed below in section E. Cooktop hood shall have a residential suppression system as listed in spec section 11 4100 or equal. The suppression system shall be part of the hood or located next to the hood.
 9. The following Kitchens shall have a residential suppression system: 110E, 111E, and 118A
- E. Cooking Exhaust: Cooktop.
1. Size: 30 inches.
 2. Fan: Two- speed, 500 cfm
 3. Exhaust: Rectangular, vented to exterior.
 4. Features: Include cooktop light and removable grease filter.
 5. Finish: Painted steel, color as indicated.
 6. Manufacturers:
 - a. GE Appliances; Product JV338HWW: www.geappliances.com.
 - b. Cooktop hood shall have a residential suppression system as listed in spec section 11 4100 or equal. The suppression system shall be part of the hood or located next to the hood.
 - c. The following Kitchens shall have a residential suppression system: 110E, 111E, and 118A
- F. Microwave: Countertop.
1. Capacity: 0.7 cubic ft.
 2. Power: 700 watts.
 3. Features: Include turntable and 2-speed exhaust fan.
 4. Finish: White.
 5. Manufacturers:
 - a. GE Appliances; Product JES1160DPWW: www.geappliances.com.
- G. Disposer: Undersink
1. Manufacturers:
 - a. GE Appliances; Product GFC520V: www.geappliances.com.
- H. Dishwasher: Undercounter.
1. Controls: Solid state electronic.
 2. Wash Levels: 3.
 3. Cycles: 4, including normal.
 4. Features: Include rinse aid dispenser, optional no-heat dry, optional water temperature boost, adjustable upper rack, and adjustable lower rack.
 5. Finish: Porcelain enameled steel, color as indicated.
 6. Manufacturers:
 - a. GE Appliances; Product GLDA690PWW: www.geappliances.com.

2.02 LAUNDRY APPLIANCES

- A. Clothes Washer and Dryer: Combination.
1. Washer Size: 2.5 Cu. Ft.
 2. Dryer Size: 5.9 Cu. Ft.
 3. Controls: Rotary.

4. Cycles: Include normal.
5. Motor Speed: Single-speed.
6. Finish: Painted steel, color as indicated.
7. Manufacturers:
 - a. Whirlpool Corp; Product WET3300XQ: www.whirlpool.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify utility rough-ins are present and correctly located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.03 ADJUSTING

- A. Adjust operating equipment to efficient operation.

3.04 CLEANING

- A. Remove packing materials from equipment.
- B. Wash and clean equipment.

END OF SECTION

SECTION 114000 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes furnishing & installing all items of equipment for foodservice facilities indicated on the Drawings, Specifications or Schedules. Note the primary connection of the equipment to the building utilities will be by the appropriate Plumbing, Mechanical or Electrical Contractor.
- B. Note, All interconnection piping, wiring, switches, disconnect equipment etc. required for proper operation of fabricated equipment must be provided as part of the equipment.
- C. All electrical units and equipment shall be of voltages indicated in this specification section and/or on contract drawings, both kitchen and Electrical. Job site verification must be made prior to ordering the equipment. Should there be any difference in the current characteristics at the job site, from that listed on the drawings; it must be submitted to the Architect for clarification. In no event will a failure to inspect the site constitute grounds for any claim.
- D. Unless indicated otherwise, all electrically operated portable or movable equipment shall be furnished with three wire or four-wire type SJ rubber cord with ground plug. One leg or cord shall be grounded to the frame of the equipment. Where indicated, electrical subcontractor is required to provide & install power cord appropriate for equipment voltage and amperage.
- E. No extra charge will be paid for furnishing items required by regulating agencies even though such may not be shown on drawings or called for in the specifications.

1.3 SUBMITTALS

- A. Product Data: For each type of manufactured or "buy-out" product indicated. Include the following:
 - 1. Manufacturer's illustration or cut sheet.
 - 2. Manufacturer's exact model number.
 - 3. Options, accessories, and components that will be included for Project..
 - 4. Quantity Required
 - 5. Reference Number (Keyed to Architect's Schedule)
 - 6. Job Name.
 - 7. Clearance requirements for access and maintenance.

8. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.
 9. Arrange sheets numerically according to Architect's schedule and bind into a booklet.
- B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.
1. Key Equipment to Architect's Schedule
- C. Coordination Drawings: For foodservice facilities.
1. Must be submitted to the Architect for review within 30 days after award of contract.
 2. Indicated locations of foodservice equipment and connections to utilities (Including sleeves and conduit).
 3. Provide dimensions to indicate all utility connections in both plan and height.
 4. Key equipment using same designations as indicated on Drawings.
 5. Include plans and elevations; clearance requirements for equipment access and maintenance; detail of support for equipment; and utility service characteristics.
 6. Include details of seismic bracing for equipment. (Note seismic site class "C")
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each factory-applied color finish required, in manufacturer's standard sizes.
- F. Operation and Maintenance Data: For foodservice equipment to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Closeout Procedures," include the following:
1. Product Schedule: For each foodservice equipment item, include the following:
 - a. Designation indicated on Drawings.
 - b. Manufacturer's name and model number.
 - c. List of factory-authorized service agencies including their addresses and telephone numbers.
 2. Retain and organize by reference number, all printed literature shipped with equipment.
- G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF/ANSI standards.
- B. BISSC Standards: Provide bakery equipment that complies with BISSC's "Sanitation Standards for the Design and Construction of Bakery Equipment and Machinery."
1. Provide BISSC-certified equipment.

- C. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards and that are UL certified for compliance and labeled for intended use.
- D. Regulatory Requirements: Install equipment to comply with the following:
 - 1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
 - 2. NFPA 54, "National Fuel Gas Code."
 - 3. NFPA 70, "National Electrical Code."
 - 4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."
 - 5. NSF, "National Sanitation Foundation"
 - 6. SCDHEC, "South Carolina Department of Health and Environmental Control"
- E. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 PROJECT CONDITIONS

- A. As construction progresses, update Co-ordination drawings with Field Measurements.

1.6 COORDINATION

- A. Coordinate foodservice equipment layout and installation with other work, including lighting fixtures, HVAC equipment, and fire-suppression system components.
- B. Coordinate location and requirements of utility service connections.
- C. Coordinate size, location, and requirements of the following:
 - 1. Overhead equipment supports.
 - 2. Floor sinks and drains serving foodservice equipment.
 - 3. Roof curbs, equipment supports, and penetrations.

1.7 WARRANTY

- A. Refrigeration Compressor Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.
 - 1. Failure includes, but is not limited to, inability to maintain set temperature.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 EQUIPMENT:

A. EQUIPMENT SCHEDULE

ITEM NO. 1 - SINK, THREE (3) COMPARTMENT (1 REQ'D)

Advance Tabco 94-3-54-24RL or equal see drawing sheet K1.0

Regaline Sink, Three compartment, w/left & right-hand drainboards, 24" front-to-back x 24" wide sink compartment, 14" deep, with 11" high splash, s/s open frame base, boxed crossrails, 24" drainboards, s/s bullet feet, 14/304 stainless steel

Accessories:

- 1 ea Model K-112 Faucet, splash-mounted, 8"o.c., 12"spout, extra heavy duty
- 1 ea Model K-416-LU Wrist Handles, for splash mounted faucets (heavy duty only)
- 1 ea Model K-116 Pre-Rinse Assembly, splash-mounted mixing valve, 8" centers, with spring action flexible gooseneck
- 2 ea Model K-15 Drain, lever operated with built in overflow, 2" IPS
- 2 ea Model K-4 support bracket, for lever drains on sinks
- 1 ea Model K-351 Continuous Waste, for 2 or 3 compartment sinks
- 1 ea Model K-460 Installation, disposal cone with 6" x 9" control bracket and faucet holes, each
- 1 ea Install cone into right drainboard.
- 1 ea Model K-453 Control bracket, 14" x 16" each
- 1 ea Model K-37 Anti-Siphon vacuum breaker holes

ITEM NO. 2 - DROP-IN SINK, TWO COMPARTMENT (1 REQ'D)

Advance Tabco Model DI-2-2012 or equal see drawing sheet K1.0

Work Table, 30" wide top, with splash at rear only, 60" long, with s/s legs, side & rear s/s crossrails, 14 gauge, type 304 stainless steel top, 5" backsplash, s/s bullet feet, sink on right end.

Accessories:

Model TA-11B sink welded into table top, 16" x 20" x 12" left end

Model K-320-LU wrist Handles, for deck mounted faucets

Model K-15 Drain, lever operated with built in overflow, 2" IPS

Model K-4 Support Bracket, for lever drains on sinks

Seal to all surrounding areas

ITEM NO. 3 - MOP SINK (1 REQ'D)

Advance Tabco Model 9-OP-40 x K240 x K242 x K244 x K245 x K-298 or equal see drawing sheet K1.0

Mop Sink, floor mounted, 20" L-R, 16" F-B, 12" high water level, 2" drain, stainless steel construction

Accessories for each unit:

- 1 ea Model K-240 Service Faucet
- 1 ea Model K-242 Mop Hanger
- 1 ea Model K-243 Mop Drip Tray
- 1 ea Model K-244 Hose & Hanger
- 1 ea Model K-245 Utility Shelf, 8" wide x 24" long
- 1 ea Model K-298 16" High Sides and Back Splashes

Seal to all surrounding areas

ITEM NO. 4 - SINK, HAND (1 REQ'D)

Advance Tabco Model 7-PS-87 or equal see drawing sheet K1.0

Hand Sink, wall model, 14" wide x 10" front-to-back x 5" deep bowl, 20 gauge s/s construction, 12" high side splashes, with splash mounted faucet, wall bracket. Plus C-Fold Paper Towel & Soap Dispenser.

Seal to all surrounding areas

ITEM NO. 5 - RANGE, GAS, HEAVY DUTY, 36" (1 REQ'D)

Vulcan Hart Model G36S-4FT12 or equal see drawing sheet K1.0

Range, 36" Heavy-Duty, Gas (4) 32,000 BTU open burners w/ cast iron top grates, 12" Griddle , standard oven w (1) rack, s/s front, top front ledge & sides, 6" s/s legs, 1 1/4" front gas manifold, 183,000 BTU

Accessories:

Natural Gas

3/4" rear gas connection (for single unit)

48" flexible hose gas hose with quick disconnect & restraining device

2nd year extended warranty (net)

S/S finishing back

Model CASTERS 5" Casters for freestanding units

Model 34BG Backguard/Flue riser, 34" wide, 17" high, stainless steel front & sides

S/S back to backguard

ITEM NO. 6 - SHELVING, WIRE (1 UNITS)

Unit consists of 4 shelves, 4 posts & 4 casters or equal see drawing sheet K1.0

Metro Model 2448NK3

SuperErecta® Shelf, wire 24" W, 48"L, Metroseal 3 (corrosion-resistant) finish, plastic split sleeves are included in each carton, w Microban® antimicrobial protection

Accessories:

Model 74UPK3 Super Erecta® Post, 74" H, for use with stem casters, Metroseal 3 (corrosion-resistant) finish, w/Microbab® antimicrobial protection

Model 4LD Super Erecta® Stem Caster, swivel, 4"D wheel, 1/2" face, resilient rubber wheel tread, 125 lb. Capacity

EACH UNIT CONSIST OF:

(4) SHELVES

(4) POST

(4) CASTERS W/O BRAKES

ITEM NO. 7 - REFRIGERATOR, REACH-IN (1 REQ'D)

Victory Refrigerator Model RSA-1D-S7 or equal see drawing sheet K1.0

Refrigerator, Reach-In one section, self-contained refrigeration (R134A refrigerant), stainless steel exterior, aluminum interior, std depth cabinet, full-height doors, exterior digital thermometer, 1/2 HP

Accessories:

115v/60/1-ph w/cord & plug, std.

Extended 4-yr compressor warranty within the USA,

V2E Full 2-year parts/labor service warranty within the USA.

Energy Star appliance

ITEM NO 8 - ELECTRIC INDUCTION COOKTOP (1 REQ'D)

GE Model PHP960SM or equal see drawing sheet K1.0

36" Electric Induction Cooktop 36" x 21" stainless steel

ITEM NO. 9- OVEN, GAS (1 REQ'D)

GE Model JGRP20SEN or equal see drawing sheet K1.0

GE 24" Built-In Gas Oven, Stainless Steel, Self Cleaning, Electronic Oven Controls, Standard Window, oven light, Two Oven Racks

ITEM NO. 10 - EXHAUST HOOD (1 REQ'D)

See also drawings K3.0 – K3.2 for details

ITEM NO.11 - FIRE SUPPRESSION SYSTEM (1 REQ'D)

See also drawings K3.0 – K3.2 for details

ITEM NO. 12 -SHELF, WALL-MOUNTED (1 REQ'D)

Advanced Tabco Model WS-15-72 or equal see drawing sheet K1.0

Shelf, wall-mounted, stainless steel, 15" overall width, 6 feet long

Seal to wall

ITEM NO. 13 - MICROWAVE OVEN, COMMERCIAL (1 REQ'D)

Panasonic NE-1054 or equal see drawing sheet K1.0

1000 Watt Commercial Microwave Oven , 20 1/8 "w x 16 9/16" d x 12" h. Power source 120v, 60hz, single phase.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.
 - 1. Connection of equipment to building utilities is by the appropriate mechanical, plumbing, or electrical contractor.
 - 2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.
- B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
 2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish.
- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and requirements of authorities having jurisdiction.
- D. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
- E. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.
- F. Verify through operating equipment prior to any inspection that all items of equipment are in complete working order. All faucets must be functioning, all drains connected, all thermostats operable, all motors rotating properly etc.
- G. All equipment must be operating during the Substantial Completion Inspection.
- H. Any damage done as a result of this installation shall be repaired and all debris shall be removed from the premises.
- I. All drains which are indicated on the drawings or specified as "indirect" shall be extended to a position above the nearest floor drain or floor sink, properly arranged to drain therein. All such drain lines shall be properly sized, 5/8" O.D., copper tubing minimum, chrome plate where exposed.

3.2 CLEANING AND PROTECTING

- A. After completing installation of equipment, repair damaged finishes.
- B. Protect equipment from damage during remainder of the construction period.
- C. Clean and adjust equipment as required to produce ready-for-use condition. Both at Substantial Completion and when the building is ready to be occupied by the Owner.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment. Refer to Division 01 Section "Closeout Procedures."

END OF SECTION 114000

SECTION 114100 - AUTOMATIC RESIDENTIAL FIRE EXTINGUISHING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes minimum requirements for fire extinguishing systems which discharge chemical from fixed nozzles by means of expellant gas. It contains essentials necessary to ensure compliance with the National Fire Protection Association (NFPA) standards and Underwriters Laboratories Incorporated (U.L.).
- B. This specification is prepared for the use and guidance of those charged with the purchasing, designing, and approving fire extinguishing systems pre-engineered for residential kitchen range top protection.

1.2 DEFINITIONS - For the purpose of clarification, the following general terms used with special technical meanings in this specification are defined:

- A. WET CHEMICAL: Normally a solution of water and potassium carbonated-based chemical, potassium acetate-based chemical or a combination thereof, which forms an extinguishing agent.
- B. LISTED: Equipment or materials included in a list published by Underwriters Laboratories Incorporated (U.L.)
- C. APPLIANCE: For the purpose of this specification, appliance means a residential type kitchen range supplied by gas or electricity to power and heat range top burners.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for product specified.
- C. Maintenance data to include in the Operating and Maintenance Manual specified in Division 1.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage Installer that is certified by system manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Pem All Safety Gourmet Model PPA27-W-1-XX, The Guardian Model #G300A or Fire System USA Model #G3, Automatic Residential Fire Extinguishing System: or equal.
2. Comply with division 1 of these specifications for submittal, review and acceptance of items considered by the Architect to be equal.
3. Kitchens 110E, 111E, and 118A will receive the residential hoods with fire protection system with alarm interface and connection and connection for building fire alarm and notification.

- 2.2 GENERAL DESCRIPTION: The fire extinguishing system shall be capable of detecting a cooking grease fire originating on the range top, extinguish the fire, and prevent re-ignition, while at the same time, shut off the gas or electric supply to surface elements on the kitchen range top. Each system shall be provided with a means to distribute the chemical agent, fire detection components, container for storing the chemical, valve assembly with pressure gauge, and appliance shutoff device. These components shall be provided factory assembled and ready for installation and installed in accordance with an approved owner's manual.
- A. CERTIFICATION: The fire extinguishing systems shall have a current U.L. listing under the category "Residential Range Top Fire Protection" in the most recent Fire Protection Equipment Directory (FPED).
 - B. CHEMICAL AGENT: WET CHEMICAL shall conform to the requirements of National Fire Protection Association (NFPA) Standard No. 17A for Wet Chemical Fire Extinguishing Systems.
 - C. SYSTEM ENCLOSURE: The system enclosure shall consist of the pressurized extinguisher cylinder with wet chemical fire suppressant, with pressure switches connections, release valve, and cylinder pressure gauge. Operation of the extinguisher unit is controlled by the mechanical heat detector links. System discharge is initiated through the heat link, activating the alarm and the discharge of the extinguisher fire fighting agent. The electric or gas shutdown devices can either be electrical operated by the pressure switch, or pneumatic from the pressure in the system discharge line.
 - D. CYLINDER AND VALVE ASSEMBLY: The extinguisher cylinder and valve assembly shall be provided fully charged with chemical and pressurized with dry nitrogen in accordance with listed requirements. A pressure gauge attached to the valve assembly shall be positioned to allow visual inspection when installed within a kitchen cabinet. Maximum allowable height of container (including the enclosure assembly) shall not exceed 12 inches. The container and valve assembly shall be of the re-serviceable type and provide maintenance requirements synonymous with that required for portable handheld fire extinguishers, according to National Fire Protection Association (NFPA) Standard 10. The container and valve assembly shall be provided factory assembled to be installed above the stove cabinet. Assembly shall include a pre-mounted pressure switches for control of shutoff device and necessary attachment for the Fire Detection link cable. The complete extinguisher cylinder and valve assembly shall be installed in a protected area above the range hood (normally, kitchen cabinets). Installations which expose extinguisher cylinder and valve assembly to direct cooking heat and grease will not be accepted.

- E. AUDIBLE ALARM, STROBE, and OR COMBINATION: Safety Gourmet is equipped with a DPST Pressure Switch suitable for connections to Alarms, Fire Alarm Panels, and Power Sources. The alarms will be activated only when the system is discharged or the pressure falls below 80 PSI. The system alarm is designed to continuously sound once the system has been activated by a stove top fire. The system alarm activates without electrical power, however the alarm function needs electrical power to function.
- F. AUXILIARY OUTPUTS: Up to four pressure switches can be provided, additionally the manual reset relay can be used as a connecting point for alarms and annunciators.
- G. TEMPERATURE ACTIVATED SENSOR ASSEMBLY: The detection assembly shall consist of four (4) metal link detector heat sensors, normally one per burner. Either fusible or reusable links may be used. Additionally the detection unit consists of corner pulleys, anchors, crimps, s-hooks tension adjuster and stainless steel cable.
- H. DISTRIBUTION ASSEMBLY: The distribution assembly shall consist of one main hose and two (2) flex hoses connected to the adjustable nozzle assemblies. The use of copper tubing shall not be accepted. Hose and nozzles shall comply with NFPA Standard No. 17A for Wet Chemical Extinguishing Systems and shall have been listed by Underwriters Laboratories, Inc. (U.L.) for this application.
- I. APPLIANCE NOZZLES: Wet System: Appliance nozzles shall be constructed of brass. Appliance nozzles with painted surfaces shall not be accepted. Appliance nozzles shall not extend below the lowest component of the range hood. Design shall provide equal distribution of chemical agent and allow chemical to flow effectively with low velocity to avoid splattering of burning grease.
- J. APPLIANCE SHUTDOWN DEVICE: Each system shall be provided with a listed device to automatically shut off the gas or electric supply to surface burners on the kitchen range top upon activation of the alarm from the fire detection unit via the cylinder operated pressure switch. The gas or electric supply shall remain "off" until manually reset. Electrical power cutoff to kitchen range hood exhaust fan shall not be required for Underwriters Laboratories Incorporated (U.L.) listed extinguishing systems.
- K. GAS SHUTOFF: Once activated via interconnection cable, the gas valve will remain in the closed position and will require manual reset by depressing the reset button located on the top of the gas control box. The gas control box is powered by the 110 volt AC.
- L. ELECTRIC SHUTOFF: Once activated via interconnection with system pressure switch it will close the electrical current to the range via a contactor or shunt trip breaker. Reset only when the fire suppression system cylinder is recharged.
- M. OWNER'S MANUAL: Each system shall be provided with a comprehensive owner's manual that shall contain procedures for post cleanup, parts identification, a complete wiring diagram, system installation with pictorials for step-by-step procedures, system limitation, and inspection and maintenance requirements. Re-servicing/recharging procedures can also be contained in the owner's manual.

- N. ALARM INTERFACE ENCLOSURE: When the system needs to be monitored by a building alarm, the alarm interface will be provided by the cylinder pressure switch.
- O. AGENT CYLINDER: System cylinder is deliberately isolated from the heat source Placement shall be in an adjacent or overhead cabinet. In all instances safety and performance is the primary concerns.
- P. COVERAGE: The Pem All Safety Gourmet will protect a range top fire on a surface that is 24" x 42" or 1008 square inches. This is the type of fire which occurs when a pot or pan is engulfed by flame during cooking.
- Q. CERTIFICATION: The Pem All Safety Gourmet systems can only be installed and maintained by a Distributor trained and certified by Pem All Fire Extinguished Company Certifications must be up to date and Distributor in good standing.

END OF SECTION

SECTION 12 3600**COUNTERTOPS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Countertops for architectural cabinetwork.

1.02 RELATED REQUIREMENTS

- A. Section 06 4100 - Architectural Wood Casework.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. AWI (QCP) - Quality Certification Program, www.awiqcp.org; current edition at www.awiqcp.org.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.
- D. PS 1 - Structural Plywood; 2007.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- 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.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. LEED Report: Submit for wood products made from sustainably harvested wood, salvaged and reused wood, wood fabricated from recovered timber, and locally-sourced wood, as specified in Section 01 3515.

1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
- B. Quality Certification: Provide AWI Quality Certification Program inspection report and quality certification of completed work.
 - 1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
 - 2. Prior to delivery to the site provide shop drawings with certification labels.
 - 3. Provide labels on each product when required by certification program.
 - 4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
 - 5. Arrange and pay for inspections required for certification.
 - 6. Replace, repair, or rework all work for which certification is refused.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

- A. Plastic Laminate Countertops: High pressure decorative laminate sheet bonded to substrate.
 - 1. Laminate Sheet, Unless Otherwise Indicated: NEMA LD 3 Grade HGS, 0.048 inch nominal thickness.
 - a. Finish: Matte or suede, gloss rating of 5 to 20.
 - 2. Back and End Splashes: Same material, same construction.

2.02 ACCESSORY MATERIALS

- A. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.
- B. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.
- C. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
 - 1. Join lengths of tops using best method recommended by manufacturer.
 - 2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
 - 3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
 - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 - 2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.
- C. Seal joint between back/end splashes and vertical surfaces.

3.04 CLEANING

- A. Clean countertops surfaces thoroughly.

3.05 PROTECTION

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

END OF SECTION

SECTION 21 00-00FIRE SUPPRESSIONPART 1: GENERAL PROVISIONS1.1 SCOPE:

a. The work in this contract consists of adjustment to the existing fire protection system, moving or addition of sprinkler heads and piping as needed, to accommodate the new renovations. This specification includes the furnishing of all labor, materials, equipment and service necessary or incidental to the complete installation testing, adjusting and placing into service of fire protection systems, for the areas affected by this renovation as shown on the drawings or as hereinafter specified. Drawings and specifications are considered as mutually explanatory criteria and all work called for by one and not the other shall be performed as though called for by both. In cases of conflicting information, the Architect/Engineer shall be notified at once in writing. Where incidental equipment or appurtenances as required, and are not listed as shown, same shall be furnished as required for a complete fire protection system.

b. Work included in this specification shall consist of, but is not necessarily limited to, the following items:

1. Arrange for, obtain and bear the cost of necessary permits, bonds and fees for the automatic sprinkler work.

2. Furnish and install sprinkler system to sprinkler the renovated areas of the building, System to include all pipe, hangers, sprinkler heads, valves, controls, drains, and alarms.

3. Do the testing of all piping work installed and necessary cleaning of the fire protection work.

4. Furnish the shop drawings and certificates of inspection.

5. Periodically remove from the job site all rubbish or debris resulting from the fire protection work.

6. Do all cutting and patching.

7. Miscellaneous items as hereinafter specified.

1.2 RELATED DOCUMENTS:

a. The following related document shall apply to and govern the work in this section of the specifications:

1. Section 23 0500 – Common Work Results for HVAC

1.3 QUALIFICATIONS OF CONTRACTORS:

a. The Contractor for the Fire Protection installation shall be a qualified Fire Protection Contractor, regularly engaged in the installation of automatic fire sprinkler systems and other fire protection equipment.

1.4 WORK BY OTHERS:

a. Electrical Contractor to wire all water flow switches and tamper switches on valves to central alarm panel. He shall also wire alarm bells.

1.5 STANDARDS, CODES AND REGULATIONS:

a. The applicable current standards for the fire protection systems shall be the National Fire Protection Association (N.F.P.A.), N.F.P.A. - 13 International Building Code, and all other applicable state codes and ordinances.

1.6 SUBMITTAL (SHOP) DRAWINGS AND DATA:

a. Before commencing any work or providing materials at the job site for this project, the Fire Protection Contractor shall submit to the Engineer, for his approval, eight copies of catalog cuts and descriptive matter regarding materials and equipment which he intends to furnish and install. Shop drawings and data shall be submitted specifically for, but not limited to, the following items:

1. Sprinkler heads, valves, pipe, pipe hangers and couplings, hose valves and accessories, and fire department connections.

b. The Fire Protection Contractor shall prepare calculations and shop drawings for automatic sprinkler work showing the arrangement of all automatic sprinkler piping and equipment, spacing of sprinkler heads, elevations of lines and details necessary for the conduct of work. The Contractor shall submit to the specifying engineer, for approval, four copies of his shop drawings and calculations.

c. The Engineer shall review the drawings and calculations and upon approval issue a certificate of compliance, which is to be submitted to the authority having jurisdiction along with the shop drawings for his/her approval.

c. The Fire Protection Contractor shall not proceed with the installation of the work until he has received the approval of the authority having jurisdiction.

d. The Engineer's approval of shop drawings, catalog cuts, etc., shall not relieve the Fire Protection Contractor of the responsibility for any errors or omissions which may exist in the items submitted, nor shall it relieve him from responsibility for deviations for the contract drawings or specifications.

e. In the event additional clarifying details are required by inspection authorities, the details shall be prepared and approval of the same secured by the Fire Protection Contractor at his expense.

PART 2: PRODUCTS

2.1 GENERAL:

a. All materials and equipment furnished under this Section (21 00 00) shall be new, approved by Underwriters' Laboratories, Inc. (UL), Factory Mutual (F/M), and American Water Works Association (AWWA) where applicable.

b. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications.

2.2 AUTOMATIC SPRINKLER SYSTEM:

- a. Pipe shall be new, designed for 175 PSI working pressure, conforming to ASTM specifications, and have the manufacturer's name or brand, along with the applicable ASTM standard, marked on each length of pipe.
- b. Pipe shall be steel, Schedule 40, black, and in accordance with specifications ASTM A120 or A53 or Schedule 10, black, and in accordance with specifications ASTM A135.
- c. Tubing shall be copper, Type L, suitable to withstand water working pressure not less than 175 PSI, and in accordance with specification ASTM B75 or ASTM B88.

2.3 FITTINGS (AS AND SP):

- a. Screwed fittings shall be cast iron, 125 pound Class, black, and in accordance with ANSI B16.4 or malleable iron, 150 pound Class, black, and in accordance with ANSI B16.3.
- b. Flanged fittings shall be cast iron, short body, Class 125, black, and in accordance with ANSI B16.1. Gaskets shall be full face of 1/8" minimum thickness red sheet rubber. Flange bolts shall be hexagon head machine bolts with heavy semi-flushed hexagon head nuts, cadmium plated, having dimensions in accordance with ANSI B18.2.
- c. Weld fittings shall be steel standard weight, black, and in accordance with ANSI B16.9, ANSI B16.25, ASTM A234, ANSI B16.5 or ANSI B16.11.
- d. Grooved couplings and mechanical fittings shall be malleable iron, 500 PSI working pressure, in accordance with ASTM A47. Coupling gasket material shall be butyl rubber. Grooved couplings shall be tested and listed by UL and/or FM. Mechanical locking fittings shall not be used.
- e. Fittings for copper piping shall be wrought copper and bronze solder joint pressure fittings in accordance with ANSI B16.22 and cast bronze solder joint pressure fittings in accordance with ANSI B16.18.

2.4 VALVES (AS AND SP):

- a. Outside screw and yoke (OS&Y) gate valves, shall be flanged, iron body, bronze mounted, 175 PSI working pressure, with handwheel turning counter-clockwise to open. Valve shall be tested and listed by UL and/or FM.
- b. Check valve (ck.v.) shall be flanged, swing type, iron body, bronze seat ring and disc rings and 175 PSI pressure rating. Valve shall be tested and listed by UL and/or FM.
- c. Check valve (ck.v) shall be butterfly wafer style, iron body, rubber seal, and 250 PSI pressure rating. Valve shall be tested and listed by UL and/or FM.

2.5 ACCESSORIES (AS AND SP):

- a. Sprinkler heads shall be upright, pendent, concealed, vertical sidewall, horizontal sidewall, and/or dry pendent type as required, 1/2" and/or 17/32" orifice, 1/2" and/or 3/4" pipe thread, rated 165 degrees F., 212 degrees F., and/or 286 degrees F. Sprinklers in areas with suspended ceilings shall be concealed type. Sprinklers shall be tested and listed by UL and/or FM. Furnish steel enameled box housing 12 spare heads and a sprinkler wrench.

PART 3: EXECUTION

3.1 AUTOMATIC SPRINKLER SYSTEM:

a. Schedule 40 black steel pipe shall be joined by screwed joints in accordance with specification ANSI B2.1, by welded joints in accordance with specifications ANSI B31.10, ANSI B31.1.0a and ANSI B31.1.0b, and by mechanical grooved couplings or push-on couplings, joined by a UL and FM approved combination of couplings, gaskets and grooves. Grooves may be rolled or cut and they shall be dimensionally compatible with the couplings.

b. b. Schedule 10 black steel ASTM A135 sprinkler pipe shall be joined by grooved joints in accordance with specifications ANSI B31.1.0, ANSI couplings. Couplings to be of the rolled groove type. Grooves shall be dimensionally compatible with the coupling. Do not use cut grooves.

c. Copper tubing shall be joined by brazed joints except solder joints may be permitted for wet-pipe systems in light hazard occupancies where the temperature classification of the installed sprinklers is ordinary or intermediate. Solder joints may also be permitted for ordinary or intermediate. Solder joints may also be permitted for wet-pipe systems in ordinary hazard -Group 1 occupancies where the piping is concealed. Brazing shall be done in accordance with specifications ANSI B31.1.0, ANSI B31.1.0a, and ANSI B31.1.0b. Brazing filler metal shall be classification BCUP-3 or BCUP-4 in accordance with AWS A5.8. Solder metal shall be 95-5 (tin-antimony - Grade 95 TA) in accordance with ASTM B32.

d. The interior surfaces of all piping and equipment shall be clean and free of all dirt, loose scale, rust, and other foreign material before installation.

e. Pipe ends shall be reamed to remove all burrs, and pipe sections shall be cleaned inside to remove all chips and foreign material prior to making up joints. Approved joint compound shall be applied to the threads of the pipe and not in the fitting when making up joints. Pipe shall not extend into the waterway of the fitting.

f. Sprinkler heads installed where they may be exposed or subjected to mechanical damage shall be furnished complete with head guards.

g. When welding pipe on job site, the fire hazard of the welding process shall be suitably safeguarded.

h. Pipe passing through building walls and floors above grade shall be provided with sleeves of standard weight galvanized steel pipe. The annular spaces between pipe and sleeves shall be packed tight with link seal hydrostatic pipe wall sleeve. Provide chrome plated escutcheon plates large enough to cover the pipe sleeve. Sleeves shall be sized as follows:

1"	2" ID sleeve
1-1/4" pipe	2" ID sleeve
1-1/2" pipe	2-1/2" ID sleeve
2" pipe	3" ID sleeve
2-1/2" pipe	4" ID sleeve
3" pipe	5" ID sleeve
4" pipe	6" ID sleeve
6" pipe	8" ID sleeve
8" pipe	10" ID sleeve

3.2 PIPE SUPPORTS:

a. All piping shall be supported by means of hangers tested and listed as approved by UL and/or FM. Sizing, spacing and installation shall be in accordance with National Fire Protection

Association Standard No. 13 "Sprinkler Systems", except as otherwise shown on drawings or specified herein.

b. No cutting, drilling, welding or burning of any structural steel member shall be allowed. Power driven studs and welding studs shall not be allowed.

c. All bolts and threaded rods shall be used with double nut washer, or single nut, washer and lock washer wherever a single unsecured nut could work loose and allow either threaded rod or supported piping to drop.

d. Starting length, end length and alternate lengths of main piping with grooved joint couplings shall be provided with two supports.

3.3 TESTS AND INSPECTION:

a. The Fire Protection Contractor shall conduct and bear the costs of all necessary tests of the fire protection work, furnishing all labor power and equipment. All piping shall be tested with water, the tests witnessed by representatives of the Architect.

b. The fire protection piping shall be tested under a hydrostatic pressure of not less than 200 pounds PSIG, for a duration of not less than two (2) hours.

c. The piping subjected to the hydrostatic test shall be filled with water and thoroughly checked for the elimination of all air. The control valves of existing risers shall be closed during pressure testing of the new connection to the main. All joints shall be proven tight or acceptable by the test. Defective work or materials shall be corrected or replaced in an approved manner. If necessary, piping shall be dismantled and reassembled with the use of new pipe or fittings, as no caulking or makeshift method of temporary repair of defective work will be permitted. Tests shall be repeated until the particular line or system receives the approval of the representatives of the Architect.

d. Acceptance of the automatic sprinkler work shall be based upon the inspection and tests of the completed installation by representative of the local Fire Department , USC Fire Marshal and the Engineer.

3.4 WATER DAMAGE:

a. The Fire Protection Contractor shall be responsible for any damage to the work of others, to building and property/materials of others caused by leaks in automatic sprinkler equipment, unplugged or disconnected pipes or fittings, and shall pay for necessary replacement or repair of work or items so damaged during the installation and testing periods of the automatic sprinkler work.

3.5 HYDRAULIC CALCULATIONS:

a. The fire protection system design is to be based on a combination of manual standpipe, sprinkler risers and sprinkler system. The Fire Protection Contractor shall prepare hydraulic calculations for the design of the system and submit for approval to the Engineer as part of the shop drawings called for in these specifications.

End of Section



Fire Sprinkler System Specification Sheet

(Per §40-10-250)



Project Data

Project name: Maxcy College			
Location in South Carolina:	Address (street # & street name): USC Campus COLUMBIA SC		State project: Yes
	City: COLUMBIA	County: RICHLAND	State project #: H27-6073-AC

Water Supply Information

(flow test data must be less than 1 year old per §40-10-250(A)(1))

Date test conducted:	Static pressure (psi):	Residual pressure (psi):	Flow (gpm):
Distances of test gauges relative to the base of the riser:		Horizontal (ft): 965	Vertical (elevation difference in ft): +14.5
Source of water supply:	<u>Municipal circulation</u>		Pipe Size (in.): 6"
Test data by/from:	Name: SEE EXISTING FIRE PUMP TEST DATA	Title:	
			Telephone #:
Fire pump:	existing SEE NOTES	Pump Capacity (gpm): 750	Churn Pressure (psi): 125
		Rated Pressure (psi): 106	Pressure @ 150% flow (psi): 81
On-site storage tank:	No	<input type="checkbox"/> New <input type="checkbox"/> Existing	Tank capacity (gallons):

NFPA Hazard Classification

(attach continuation page when necessary)

Area #	Class or Code Reference	Description of Hazard Protected (commodity description, storage height, and arrangement as applicable.)
1	Light Hazard	OFFICES, DORM ROOMS, BREAK ROOMS, LOUNGES
2	Ordinary Hazard I	STORAGE, KITCHEN AND DINING AREAS
3	Light Hazard	ATTIC

Design Parameters

(attach continuation page when necessary)

Area #	System Type	Density (gpm/ft ²) / Area (ft ²) or Other (reference code section)	Inside Hose (gpm)	Outside Hose (gpm)
1	WET PIPE	0.1/1500		100
2	WET PIPE	0.15/1500		250
3	DRY PIPE	0.1/1500		100

Seismic Design Data: S_s = Zone D

Codes and Standards

(attach continuation page when necessary)

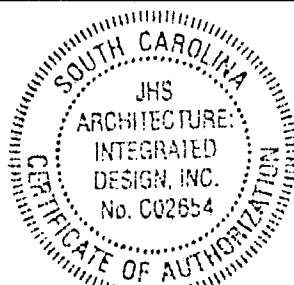
Applicable Codes, Standards & Editions (i.e. "2006 IBC", "2007 NFPA 13", etc.) for the Scope of Work on the Sprinkler System

Sprinkler System NFPA 13 (2010), IBC (2006), IFC (2006)

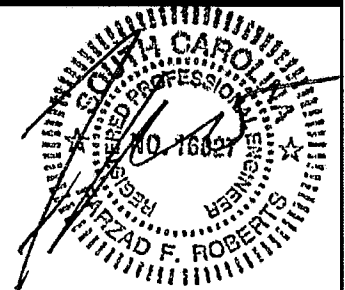
Scope of work (such as sprinkler system A.G. from 1'-0" A.F.F., U.G. from tap to 5'-0" outside, etc.) and notes (attach continuation page when necessary):
Existing sprinkler system revised for renovated areas. **ARRANGEMENT HAS BEEN MADE FOR A TEST UTILIZING TEST HEADERS, AS REQUIRED EVERY THREE YEARS, BY NFPA 25 8.3.3.1.3**

Specifier's Information

Name: Farzad F. Roberts	
Engineering services provided through a firm: <input type="checkbox"/> Yes	
Firm name: JHS ARCHITECTURE	
Address: 1812 LINCOLN ST	
City: COLUMBIA	
State: SC	Zip: 29201
Phone #: 803-252-2400	Fax #: 803-252-1630
E-mail: FROBERTS@JHS-ARCHITECTS.COM	



Certificate of Authorization



Professional Engineer's Seal

Palmetto Automatic Sprinkler Co, Inc.

Post Office Box 2927

West Columbia, SC 29171

Phone: 803-794-1602 Fax: 803-794-8877

009

Annual Inspection and Testing of Fire Pump Assemblies

Property Name: USC Maxcy Inspector: Robert A. Davis
 Property Address: 1332 Pendleton St. Columbia, SC 29208 Contract No.: 8102
 Phone Number: (803) 212-8775 Todd Griffin Date: 5/26/11

Test Data

Electric Pump System:	
Time controller during the starting transition from Reduced Voltage to Full Voltage	1 sec.
Time required for motor to reach full speed	2 sec.
Diesel Pump System:	
Time required for engine to crank	sec.
Time required to reach running speed	sec.
Observations while Engine operating:	
Oil Pressure	psi
Speed indicator	rpm
Water temperature	°F

Pump:	
Make Fairbanks Morse	Serial # K4E1025768
Type 2873A 4" Horizontal Split case Single Stage Centrifugal	
Rated Capacity 750 gpm	
Rated Pressure 104.6 psi and 84.9 at 150% with a maximum net of 121 psi	
Rated RPM 3555	
Date of last annual flow test 5/13/10	
Controller:	
Make Metron	Model M700A2M-75-208C
Listed UL 799L	
Jockey pump on at 148 psi off at 165 Fire pump on at 124 psi	

Comments/Deficiencies:

Pump Performance Curve Test Data

Flow	Suction Pressure (PSI)	Discharge Pressure (PSI)	Net Pump Pressure (PSI)	Pump Speed (RPM)	Pitot Pressure	Dia. Of Nozzle Openings	No. of Nozzles Flowed	Flow Based on Pitot Pres.	Opening Coefficient C=	Actual Flow (GPM)
Churn	64	189	125	3581						
100%	65	171	106	3571	N/A	----	----	----	----	750
150%	65	146	81	3564	N/A	----	----	----	----	1125
	Volts	Lead #1 (AB)	Lead #2 (BC)	Lead #3 (AC)		Amps	Lead #1	Lead #2	Lead #3	
Churn	200 3phase	206.5	207.4	207.7		207	119.3	122.5	123.3	
100%		205.6	206.9	207.1			158.1	163.8	163.1	
150%		205.3	206.5	206.8			182.3	188.1	189.9	

Method of discharge Returned to suction via flow meter
 Signature: Robert A. Davis

Palmetto Automatic Sprinkler Co, Inc

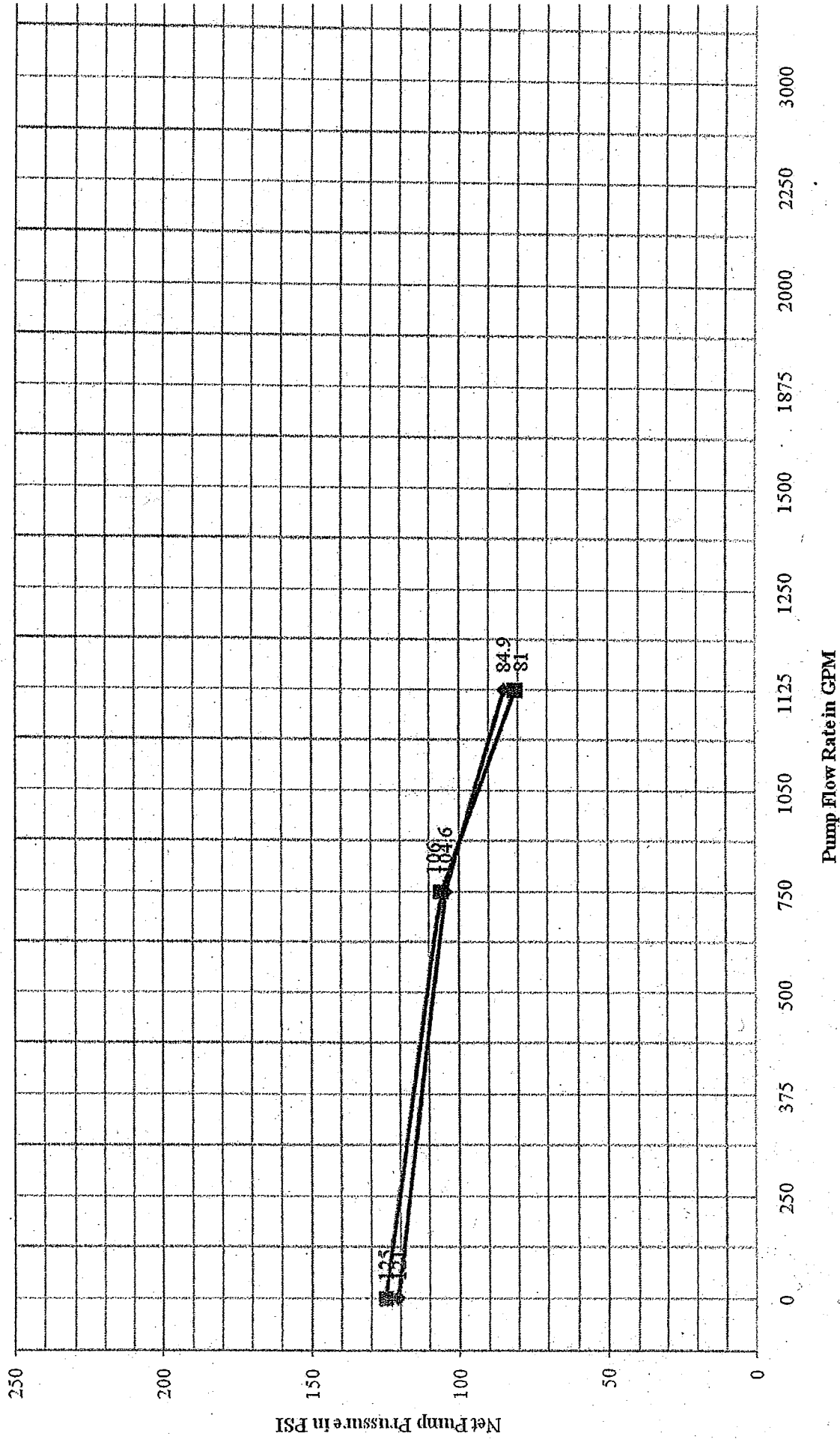
Post Office Box 2927

West Columbia, SC 29171

Phone: 803-794-1602 Fax: 803-794-8877

USC Maxcy

◆ Rated Net PSI @ Flow Rate ■ Actual Net PSI @ Flow Rate



SECTION 22 0500

COMMON WORK RESULTS FOR PLUMBING

PART 1: GENERAL

1.1 DESCRIPTION:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

b. This section of specifications and related drawings describe requirements pertaining to basic materials and methods.

c. Please refer to coordination process requirements in Division 1.

d. Manufacturer and model numbers cited are for reference only. It is not the intent of this specification to limit the bidding to the manufacturers cited. Bidders may use products from other manufacturers subject to the prior approval provisions of the specifications.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

a. Manufacturer's cuts.

b. Certified capacity ratings.

c. Installation instructions.

d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 PIPES:

a. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications

b. Manufacturer and model numbers cited are for reference only. It is not the intent of this specification to limit the bidding to the manufacturers cited.

2.2 PIPE SPECIALTIES:

a. Pipe specialty equipment shall be provided on all piping on all piping system as specified or as required by code.

b. Provide dielectric unions on the inlet and outlet connection to water heaters storage tanks and at all places where dissimilar metals join in piping and plumbing systems. Use dielectric unions as manufactured by Watts Regulator Inc., Zurn/Wilkins, Victaulic or equal.

c. Vacuum breaker shall be provided on each hose outlet. This includes hose bibbs, service sinks, wall hydrants, etc.

d. A system of pulsation absorbers shall be provided for all quick closing valves and where shown on the drawings. The system is to be selected in accordance with PDI Standard W-201. Absorbers shall be by JOSAM, ZURN, SMITH or approved equal.

e. Valves and Accessories:

1. Provide valves as indicated and required as scheduled below. Figure numbers are provided to indicate type and quality. Insofar as possible, all valves shall be by a single manufacturer as specified or approved equal.

<u>MANUFACTURER</u>	<u>GATES 125#</u>	<u>GLOBES 150#</u>	<u>CHECK 125#</u>
NIBCO	T134	T235-Y	T413-B
CRANE	428-UB	-	37
STOCKHAM	B-105	B-22	B-319

f. SOLDER ENDS, SCREWED BONNET GATES, UNION BONNET GLOBES, (Globes with Teflon disc):

<u>MANUFACTURER</u>	<u>GATES 125#</u>	<u>GLOBES 150#</u>	<u>CHECK 125#</u>
NIBCO	S111	S235-Y	S413-B
CRANE	428-UB	-	1342
STOCKHAM	B-109	B-24	B-309

g. Hose end gate valves, 3/4 - 2" shall be JENKINS NO. 372, CRANE 451, POWELL 503 or approved equal.

h. Wall hydrants shall be cast brass non-freeze, heavy duty with polished chrome face, brass operating parts, adjustment locknut, renewable nylon seat, 3/4" standard hose outlet, locking cover.

2.3 HANGERS AND SUPPORTS:

a. Pipe supports shall be provided for all piping. Pipe support components shall conform to accepted standards.

1. Hangers shall adequately support the piping system. On horizontal, hangers shall be located near or at changes in piping direction and concentrated loads. They shall provide vertical adjustment to maintain pitch required for proper drainage. They shall allow for expansion and contraction of the piping.

(a) Pips shall be supported as follows:

Piping Material	Max. Horizontal Spacing (feet)	Max. Vertical Spacing (feet)
Cast Iron	5	15
Copper or Copper Alloy Piping	12	10
Copper or Copper Alloy Tubing,	6	10

1 1/4" and Smaller		
Copper or Copper Alloy Tubing, 1 1/2" and Larger	10	10
Steel Pipe	12	15

(b) Hangers for all other pipes not addressed in the above table shall conform to International Plumbing Code Table 308.5

2. Devices for attaching pipe supports to building structure shall be provided as required and shall be as herein specified.

(a) Grinnell Type CB or equal insert shall be provided for poured-in-place concrete construction. Drilled inserts approved equal to "Phillips" self-drilling inserts shall be provided in existing concrete construction and in precast and cast-in-place concrete construction where drilled inserts are approved by the Engineer. Other type inserts, if required, are specified in the section of this Division requiring such inserts.

(b) Grinnell Figure 86 malleable C - clamp with restraining clip or equal shall be provided for attaching 2" and smaller piping to steel structure. MSS-SP-69 malleable beam clamp with extension piece or equal shall be provided for attaching 2-1/2" and larger piping to steel structure.

3. Intermediate attachments shall be hanger rods of size herein before specified and with vibration control devices as specified in the separate section of the Division. Rods may be continuous threaded or threaded each end as required. No chain, wire or perforated strap hangers shall be used.

4. Pipe attachments and spring hangers shall be as specified in individual section of this Division of the specifications.

2.4 ESCUTCHEON PLATES:

a. Pipes entering finished or occupied areas shall be provided with polished chrome plated escutcheon plates, held in place with set screws. Escutcheon plates shall be Grinnell Figure 20 or approved equal.

PART 3: EXECUTION

3.1 GENERAL:

a. All products shall be installed as per the manufacturer's instructions.

3.2 CLEANING UP:

a. Cleaning up is the responsibility of the Contractor. During construction, the site shall be kept neat so as not to be a safety hazard. Upon completion of the work, all surplus construction materials and debris shall be removed from the property.

3.3 PIPE TEST:

a. All new soil, waste, drainage and vent piping shall be tested before fixtures are installed by capping or plugging the openings, and filling the entire system with water to a minimum height of 10 feet

above grade or the highest fixture opening of the section being tested, and allowing it to stand thus filled for a period of four hours.

b. All water supply piping shall be tested before fixtures or faucets are connected by capping or plugging the opening and applying a hydrostatic test pressure of 150 psig.

c. Pipe found defective during tests shall be replaced at no additional cost to the Owner. Pipe joints found defective during tests shall be taken apart and remade.

d. The Contractor shall notify the Architect 72 hours before tests are to be made. Concealed work shall remain uncovered until specified tests are completed. All tests shall be conducted in the presence of the Architect or his representative. Repairs to defects disclosed by the test shall be made with new materials. Caulking of screwed joints, cracks or holes will not be permitted. Test shall be repeated until system is proven tight.

End of Section

SECTION 22 0523

GENERAL –DUTY VALVES FOR PLUMBING PIPING

PART 1: GENERAL

1.1 SCOPE:

- a. The Mechanical Contractor shall furnish and install all necessary valves and specialties to make the installation complete and as specified below. All specialty items unless otherwise noted shall be for operation on at least 125 pound psig working pressure as rated in accordance with the standards of the ASA.
- b. The provisions of Section 23 05 00 – Common Work Results for HVAC, apply to all the work of this Section.

1.2 SUBMITTAL: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC

- a. Manufacturer's cuts.
- b. Installation instructions.
- c. Operating and Maintenance Instructions.

1.3 SAFETY AND RELIEF VALVES:

- a. The Mechanical Subcontractor shall furnish and install safety and relief valves on all fired and unfired pressure vessels in accordance with current requirements of North Carolina Department of Labor, Boiler Bureau. All valves shall bear the stamp and approval of the American Society of Mechanical Engineers Boiler Construction Code, and shall be proper size for the respective equipment it serves.

PART 2: EQUIPMENT

2.1 VALVES:

- a. All new valves shall be as specified below by figure number and shall be one manufacturer throughout. Manufacturer and model numbers cited are for reference only. It is not the intent of this specification to limit the bidding to the manufacturers cited. Bidders may use products from other manufacturers subject to the prior approval provisions of the specifications.

- b. SCREWED ENDS, UNION BONNETS (Gates with Solid Wedge, Globes with Composition or Teflon Disc as Specified) - BRONZE VALVE LIST

<u>Manufacturer</u>	<u>Gate 125#</u>	<u>Globes 150#</u>	<u>Checks 125#</u>
NIBCO	T134	T235-Y	T413-B
CRANE	428-UB	7	37
STOCKHAM	B-105	B-22	B319

Or approved equals

- c. SOLDER ENDS, SCREWED BONNET GATES, UNION BONNET GLOBES, (Globes with Teflon Disc)

<u>Manufacturer</u>	<u>Gates 125#</u>	<u>Globes 150#</u>	<u>Checks 125#</u>
NIBCO	S111	S235-Y	S413-B
CRANE	428-UB	-	1342
STOCKHAM	B-109	B-24	B-309

Or approved equals

d. IRON VALVE LIST

<u>Manufacturer</u>	<u>Gates 125#</u>	<u>Globes 125#</u>	<u>Checks 125#</u>
NIBCO	F617-0	F718-B	F918-B
CRANE	465-1/2	351	373
STOCKHAM	G-623	G-512	G-931

Or approved equals

<u>Manufacturer</u>	<u>Gates 250#</u>	<u>Globes 250#</u>	<u>Checks 250#</u>
NIBCO	F667-0	F768-B	F968-B
CRANE	7-1/2	21E	39E
STOCKHAM	F-667	F-532	F-947

Or approved equals

e. Spring check valves shall be installed on water lines 2-1/2 inches and above. Valves shall be non-slam type of such design that closing is controlled by spring action so designed to return disc or leaves to seat at zero velocity or before reversal of flow. Disc or leaves shall be free-flowing with no greasing or counterweights required. Body shall be semi-steel, 125 psi rated. Disc or leaves and seat shall be bronze with stainless steel spring.

<u>Manufacturer</u>	<u>Wafer 125#</u>	<u>Flanged 125#</u>
NIBCO	W910-B	F910-B
MUELLER	91-AP	105M-AP
MISSION		

Or approved equals

f. Butterfly valves shall be lug type and suitable for water service. Valves shall have EPDM seats suitable for temperature up to 275 degrees Fahrenheit and pressure up to 150 psig. Body shall be cast iron, disc shall be aluminum bronze, and shafts shall be stainless steel. Valves 2" to 6" shall be interim positive lock, lever operators. Valves 8" and larger shall have encased gear operators with hand whl. Bodies shall be lug type. All working parts shall be field replaceable. All valves shall be equipped with extended neck for insulation up to 2" thick. Manufacturer must certify valves (2" through 16") to be capable of providing bubble tight seal at 200 psi when used for end of line service without the need of a flange on the down stream side. Valves 18" and larger must be capable of 150 psi end of line service.

<u>Manufacturer</u>	<u>Lug 150#</u>
---------------------	-----------------

NIBCO	LD2000
CRANE	14-TL
STOCKHAM	LD-711-BS3-E

Or approved equals

g. Hose end gate valves shall be screwed connection, bronze as specified above. Hose connection shall be as specified above. Hose connection shall be suitable for 1/2" hose.

Manufacturer Hose End 125#

NIBCO	T113-HC
CRANE	451
STOCKHAM	-

Or approved equals

h. Ball valves shall be bronze, two piece construction rated for 125 SWP/400 WOG. Valves shall have conventional port with Teflon seats. Stem shall be of silicon bronze. Sizes 1/4"-2".

<u>MANUFACTURER</u>	<u>THREADED 125#</u>	<u>SOLDER 125#</u>
NIBCO	T580	S580
APOLLO	70-100	70-200
STOCKHAM	S214-BR-T-T	S214-BR-T-S

Or approved equals

2.2 VALVE TAGS AND CHARTS:

a. Furnish for each valve and gas cock in the H.V. and A.C. system a brass tag fitted to each valve so that it may not be removed. Each tag shall be numbered consecutively with the Numbers V-1, V-2, V-3, etc..

b. Furnish two (2) copies of a master valve chart denoting valve number, location and purpose. One (1) chart shall be in a suitable black wood frame with glass cover and mounted where directed.

2.3 SPECIALTIES:

a. Gaskets: This Contractor shall furnish and install at each flange connection, Johns-Manville Service Gasket N. 60, or approved equal.

b. Flow Balance Valves: Flow balance valves, where shown, shall be Bell and Gossett Circuit Setter, or approved equal, size indicated in each case. Provide (1) differential meter to be turned over to Owner with operation and maintenance manuals.

c. Water Pressure Reducing Valve: Furnish and install in the heating and cooling system water pressure reducing valves as shown with a bypass line around the valve and fittings. Set valve at 12 psi. (adj.). Pressure reducing valves shall be 3/4" and shall be as manufactured by Cash, Bell and Gossett, Watts or approved equal.

d. Automatic Control Valves: All automatic control valves shall be of the modulating or proportioning type. See temperature controls.

e. Compression Tanks. Furnish and install the ASME and National Board Labeled Code constructed steel compression tanks indicated on plans with necessary tappings for connections to heating system. Tanks shall be supported from over head with hanger rods connected to suitable overhead structure and as called for on the plans. Equip each tank with Bell and Gossett or approved equal air control valve and separate tank drain. Drain shall be globe valve. "Boiler Drain Valves" prohibited. Tank shall be given three (3) coats of high temperature aluminum rust preventative paint on the exterior. The tanks shall be a part of the "Air Control System" in the heating system and must be furnished, guaranteed and installed in strict accordance with the manufacturer's instructions.

f. Provide drain valve with hose connection end at each zone valve in the Equipment Room and at the bottom of each pair of risers to unit throughout the building for convenient complete drainage of each zone or unit.

g. Strainers for water service with end suction pumps shall be bolted top basket type with 40-mesh monel screen. For other water service where space is insufficient for basket strainers, and for steam service strainers shall be Y-type with 40-mesh monel screen. Strainers shall have blow-down tappings, removable baskets and be iron bodied with flanged ends.

h. Pressure gauges shall be designed for the service. Gauge size shall be 4-1/2" diameter with black lettering on a white field. Provide snubber and shutoff cock. Gauge scale shall be twice the normal pressure of the line in which it is installed. Gauge shall be Bourdon tube type with bushed movement and cast aluminum case. Accuracy shall be 90% of the entire range.

i. Pipe thermometers shall be adjustable angle type and shall be provided with extensions for all thermometers mounted through insulation. thermometers shall have ranges suitable for the service. Minimum length shall be 12" and each graduation of the scale shall represent not more than 2°F. All exposed parts of the thermometer, except the case, shall be heavy chrome plated brass.

j. Flow indicators shall be Bell and Gossett Type TFI, or equal (size as required).

k. Backflow preventers, reduced backflow preventers shall be installed at each connection between any HVAC system and the domestic water supply system. Preventers shall be of bronze body construction with stainless steel internal parts and flange bolts. Assembly shall be furnished with unions at inlet and outlet to facilitate servicing. Unit shall be rated for a working pressure of 150 psi and a working temperature of 210 degrees Fahrenheit and be tested and certified in accordance with the American Society of Sanitary Engineering Standard 1013-1071.

l. Pressure reducing valves shall be installed at each fill connection of the HVAC System. Reducing valves shall be of bronze body construction with Buna-N-Nylon diaphragms, and stainless steel renewable seats.

m. Water flow meters shall be differential pressure Venturi or Orifices type, pipe mounted. Each meter shall be complete with quick disconnect valves for gauge connection. Master gauge shall be dry type with a scale reading from 0 to 5 inches of water pressure. Gauge shall be portable.

n. Relief valves shall be ASME pressure relief valve set to 15 psi above maximum normal system operating pressure. The discharge from valves on water lines shall be piped to the nearest floor drain; valves on steam lines shall be piped to the outside.

o. Air Separators: Air separators for water systems shall be tangential type with vortex

separation action. Separator shall be constructed of galvanized steel, suitable for 125 working pressure in accordance with ASME Code for Unfired Pressure Vessels. Separator shall have basket strainer. (See Strainer Specification this Section.)

p. Steam Traps: F & T Steam trap shall be open float and thermostatic type of size and capacity as required by the application. The body shall be constructed of cast iron and shall be designed so that the cap and mechanism can be removed without disturbing the piping connections. The body shall be suitable for 150 psig working pressure. Valve and valve seat shall be constructed of heat treated chrome steel. Bucket shall be brass.

q. Bucket steam trap shall be inverted bucket type of size and capacity as required by the application. The body shall be constructed of cast iron and shall be designed so that the working parts can be removed without disturbing the pipe connections. The body shall be suitable for 150 psig working pressure valve and valve seat shall be constructed of heat treated chrome steel. Bucket shall be brass.

2.4 PRESSURIZATION AND AIR ELIMINATION SYSTEM:

a. Furnish and install as shown on the drawings, a pressurization and air elimination system to accommodate the expanded water generated by the increase in temperature in a water heating or chilled water system and to control the increase in pressure at all critical components in the system to the maximum allowable for those components.

b. The pressurization and air elimination system shall ensure that all air in the system shall be eliminated. The only air in the system shall be the permanent sealed-in air cushion contained in the pressurization controller component of the system a diaphragm-type expansion tank, pre-charged to the minimum operating pressure at the location indicated on the drawings.

c. The diaphragm-type expansion tank shall be manufactured by a manufacturer who has supplied substantially the same tanks, which on the date of opening of bids, have been in successful commercial use and operation for not less than five years in projects and units of comparable size. The right is reserved by the owner to require the contractor to submit a list of buildings where they have been in operation, so that such investigation as may be deemed necessary may be made before approval.

d. The diaphragm-type expansion tank shall be welded steel, constructed tested and stamped in accordance with Section VIII of the ASME Code for a working pressure of 125 psi and shall be supported by steel legs or a base for vertical installation or steel saddles for horizontal installations.

e. All free air originally contained in the system, and all entrained air bubbles carried by the system water shall be eliminated at all points in the lowest (the point of lowest solubility), and as indicated on the drawings. The air separating and elimination component shall separate entrained air from flowing system water by the creation of a vortex which will allow free air to rise in the center, the point of lowest velocity, to an air elimination valve.

f. The air separator shall be capable of effectively separating not less than 80% of the entrained air on the first passage of water and not less than 80% of the residual air on each subsequent passage.

g. The pressure drop through the air separator at the specified flow rate shall be as shown on the drawing.

h. The air separator shall be cast iron or welded steel, constructed, tested and stamped in accordance with Section VIII of the ASME Code for a working pressure of (125).

i. Piping shall be as shown on the drawings.

j. Air shall be eliminated to the atmosphere as fast as it is separated from system water through a float activated remote pressure operated air elimination valve installed at the top of the air separator. The air elimination valve shall have a high removal rate at low pressure differentials and shall be fully open for the removal of air at all pressures in the operating range from 2 psi to 140 psi. It shall be tightly sealed against loss of system water and prevent entrance of air in negative pressure situations.

k. The valve shall be constructed of metal and all working parts shall be non-corrosive. Working pressure shall be 150 psi.

PART 3: EXECUTION

3.1 GENERAL:

a. Contractor shall install valves and specialties according to the best practice and manufacturer's recommendations.

End of Section

SECTION 22 1100FACILITY WATER DISTRIBUTIONPART 1: GENERAL1.1 SCOPE:

- a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.
- b. Contractor shall furnish and install domestic water systems as shown on the plans complete in all respects.
- c. Connect to water main and provide supply lines to all fixtures and equipment requiring water service.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.

PART 2: PRODUCTS2.1 QUALITY CONTROL:

- a. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications.

2.2 WATER PIPING AND FITTINGS:a. Water Piping:

1. All domestic water piping shall be hard drawn copper tubing ASTM B 88 Type "L" above grade, Type "K" below grade. Fittings for copper tubing shall be ANSI B16.18 or B16.22 solder joint fittings. Ends of pipe shall be reamed, pipe and fittings cleaned. Use only 95-5 (95% tin and 5% antimony) solder with non-corrosive flux on 1-1/2" and smaller and on 2" and larger use Sil-Fos, or equal.

2. Underground fire and combined domestic-fire pipe shall be ductile iron, push-on or mechanical joint, thickness Class 50, 350 PSI pressure rating, in accordance with AWWA C151, tar coated outside, cement mortar lines inside in accordance with AWWA C104.

a. Push-on joints shall be in accordance with ANSI A21.11. Gasket material shall be neoprene.

b. Mechanical joints shall be in accordance with AWWA C111. Gasket material shall be neoprene. The standard bolts and nuts of the pipe manufacturer shall be used. These bolts and nuts shall be corrosion-resistant.

c. Flanged joints shall be in accordance with ASME B16.1. Gaskets shall be full face of 1/8 inch minimum thickness red rubber. All flange bolts shall be hexagon head machine bolts with heavy cadmium plated hexagon nuts. A bituminous coating of coal tar or asphalt base shall be applied to flanges, bolts and nuts at the time of installation.

d. Fittings (for ductile iron pipe) shall be push-on or mechanical joint, 250 PSI pressure rating, in accordance with AWWA C110, tar coated outside, and cement mortar lined inside in accordance with AWWA C104.

e. Fittings in pits shall be flanged ductile iron, short body, 250 PSI pressure rating, in accordance with AWWA C110, tar coated outside, cement mortar lined inside in accordance with AWWA C104.

f. Tapping sleeve shall be mechanical joint, Class 125 outlet flange, 200 PSI pressure rating tapping sleeve, flanges, and bolts and nuts shall be coated with a bituminous coating of coal tar or asphalt base.

PART 3: EXECUTION

3.1 INSTALLATION (INSIDE):

a. Piping shall be installed so as to be free floating. 125 pound copper sweat pattern unions shall be provided in the piping as indicated on the drawings. Provide dielectric insulating unions where copper connects to ferrous piping. Use brass nipples or copper adapters at connections to fixtures.

b. Provide isolation valves for each individual riser and toilet group as required to service system.

c. Runouts:

1. Runouts to fixtures shall be grouted in place at the fixture stop to prevent pipe movement at this point. Use concrete mortar grout. Remove insulation from pipe before grouting.

2. Runouts to urinal and water closet flush valves in block and concrete walls shall have an 8" long piece of 1/2" copper, flattened and soldered to the runout and anchored in the wall. Runouts in stud walls shall have a piece of 1/2" copper flattened and soldered to the runout and fastened to studs with 1/4" bolts with nuts and flat washers (two bolts each end).

d. Unions:

1. Unions shall be installed at each piece of equipment.

3.2 STERILIZATION OF WATER PIPING:

a. Sterilization of water piping shall be in accordance with AWWA Specification 0601. After the pressure tests have been made, the system shall be flushed with water. The chlorinating material shall be liquid chlorine-water mixture calcium hypochlorite, sodium hypochlorite, or chlorinated lime-water mixture. The solution shall have not less than 50 PPM available chlorine. The disinfecting solution shall be allowed to remain in the system for a minimum period of 24 hours. After disinfection, the system shall be flushed with clean water until residual chlorine content is not greater than .02 PPM. After the system is flushed, water samples shall be taken and tested at the Contractor's expense by an independent testing lab and reports shall be furnished to the engineer's for approval. If the water is found unsafe for human consumption, the disinfection procedure shall be repeated.

3.3 TESTING OF WATER PIPING:

a. All water supply piping shall be testing before fixtures or faucets are connected by capping or

plugging the openings and applying a hydrostatic test pressure of 150 psig. Pressure shall hold constant (exception for temperature variation) for a period of 24 hours or as directed by the Engineer.

End of Section

SECTION 22 1310

FACILITY SANITARY SEWER AND DRAIN PIPING

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

b. All fixtures and equipment specified as requiring waste shall be connected to the sewer system. The sewer system shall be extended as shown on the drawings.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.
- b. Installation instructions.

PART 2: PRODUCTS

2.1 QUALITY CONTROL:

a. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications.

2.2 SOIL, WASTE, VENT AND DRAIN PIPING:

a. Soil, waste, vent and drain piping below grade shall be cast iron soil pipe.

1. All cast iron soil pipe shall be service weight ASTM A-74-69 bell and spigot, bearing the label of the Cast Iron Soil Pipe Institute. The casings shall be gray iron of good quality made by Cupola, Air Furnace or Electric Furnace Process. The resultant pipe shall be compact, close grained metal, soft enough to permit cutting and drilling. Pipe shall have been hydrostatically tested at not less than 50 pounds per square inch gauge. Factory coated by heating to 300 degrees F. and dripping in a bath of coal tar pitch and oil.

b. Soil, waste, vent and drain piping above grade shall be as follows:

1. Waste and vent lines above grade, 1-1/2" diameter and smaller shall be galvanized standard weight steel with malleable iron screw type fittings.

2. Waste and vent lines 2" and above shall be cast iron same as specified for below grade. At Contractor's option no-hub piping may be substituted for 2" and larger above grade waste and vent piping. joints above grade may be made with no-hub bands using Type II heavy duty stainless steel clamps. Bands and clamps shall conform to Cast Iron Soil Institute Standard 30I

c. Roof drain piping above grade shall be cast iron same as specified for below grade. Roof piping below grade as specified for soil, waste and vent piping.

d. Exposed vent piping shall be schedule 40 black steel Installed in a neat and workmanlike manner prime coated and ready for painting.

2.3 WASTE ARMS:

a. Waste arms serving lavatories, counter sinks and water coolers shall be threaded galvanized schedule 40 steel with schedule 40 drainage pattern fittings and adapters.

b. Waste arms serving urinals shall be standard pipe size threaded red brass pipe, with red brass threaded fittings.

2.4 SPECIALTIES:

a. Cleanout Plugs: Cleanouts shall be of the same size as the pipe except that cleanout plugs larger than 4" will not be required. Cleanouts shall consist of long sweep fittings to an easily accessible place.

b. Traps: Each fixture and piece of equipment including floor drains and hub drains, requiring connections to the drainage system shall be equipped with a trap placed as near to the fixture as possible. No fixtures shall be double trapped. Traps for floor drains and hub drains shall be deep seal "P" traps. All other traps shall be supplied under the "Fixture Paragraph".

c. Floor Flanges: Cast iron floor flanges shall be provided for connection of all floor outlet water closets. The joint between the closet trap and the floor flange shall be made tight with red or black rubber as made by Grinnell fixture setting gasket.

d. Flashing: Vent pipes shall be flashed and made watertight as the roof with 4 pound sheet lead. Flashing shall extend not less than 8" from the vent pipes in all directions. Flashing shall be extended up the vent pipes and shall be turned down into the pipe. Minimum vent through the roof shall be 2" size.

e. Floor Drains: Floor drains shall be sized as indicated on the drawings, and shall be Josam or equal. See plans for model number and size. Drains by Zurn or Wade will be acceptable.

PART 3: EXECUTION

3.1 PIPE INSTALLATION:

a. Horizontal drain and waste piping within the building shall be given a grade of 1/8" per foot below ground and 1/8" per foot above ceilings unless otherwise indicated on the drawings. Piping 3" and smaller shall have minimum grade of 1/4" per foot. Main vertical soil and waste stacks shall be extended full size to the roof line and 12" above as vents, unless otherwise indicated on the drawings. Fittings shall be service weight when used on service weight pipe. Reduction of the size of drainage piping in the direction of flow is prohibited. Vent or tap tees will not be permitted on waste lines.

3.2 JOINTS:

a. Joints between cast iron pipe and between cast iron pipe and fittings shall be made with neoprene push gaskets conforming to ASTM C-564.

b. Joints for galvanized pipe shall be threaded and have American National taper screw thread with graphite and oil compound applied to the male thread only.

c. Joints for red brass piping shall be made with American Standard taper pipe thread; apply lubricant on male thread only; burrs or cuttings shall be reamed or filled out to not less than original diameter - lubricant shall be red lead.

3.3 CLEANOUTS:

a. Cleanouts shall be installed where shown on the drawings but in no case shall they be more than 50 feet apart in piping 3" and under and 75 feet apart in piping 4" and larger.

3.4 PIPE TEST:

a. All new soil, waste, drainage and vent piping shall be tested before fixtures are installed by capping or plugging the openings and filling the entire system with water to a minimum height of 10 feet above grade or the highest fixture opening of the section being tested, and allowing it to stand thus filled for a period of four hours.

b. Pipe found defective during test shall be replaced at no additional cost to the Owner. Pipe joints found defective during tests shall be taken apart and remade.

End of Section

SECTION 22 2023

NATURAL GAS PIPING

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 22 0500 – Common Work Results for Plumbing, apply to all the work in this Section.
- b. Contractor shall furnish and install all natural gas piping as shown on the plans complete in all respects.
- c. The Contractor shall arrange with the operating Gas Company for providing gas service.

1.2 SUBMITTALS

- a. Product Data:
 1. Provide code and standards compliance verification, manufacturer's product data and ratings on pipe materials, pipe fittings, regulators, valves and accessories.
- b. Record Documents:
 1. Submit test reports and inspection certification for all natural gas systems installed under this Contract.
 2. Submit manufacturer's data reports for all material used in coating and wrapping.
 3. Record actual locations of valves, regulators, etc. and prepare valve charts.
 4. Provide full written description of manufacturer's warranty.
- c. Operation and Maintenance Data:
 1. Include installation instructions, spare parts lists, exploded assembly views manufacturer's recommended maintenance.

PART 2: PRODUCTS

2.1 QUALITY CONTROL:

- a. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications.

2.2 GAS PIPING:

- a. Gas piping shall be extended from the meter locations as shown. All gas piping shall be standard weight, black steel piping, with malleable iron fittings. All gas valves shall be lubricated, plugcock type.
- b. All gas piping shall be standard weight schedule 40 black steel pipe with weights and dimensions in accordance with ASA B36-10.
- c. Fittings in threaded pipe shall be standard weight, malleable iron, screw pattern.
- d. All pipe not coated shall be given one prime coat and one finish coat of rust resistant paint.

2.3 VALVES

- a. All valves shall be designed, manufactured and approved for natural gas service.
- b. Line Shut-off Valves sizes 2 inches and smaller shall be iron body lubricated plug valve conforming to ASTM-A-126, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, wrench operation, rated for 200 WOG service pressure and -20 to 200 degrees F., manufactured by Resun Model R-1430 or Nordstrom Model 142.
- c. Line Shut-off Valves sizes 2½ inches and larger shall be iron body lubricated plug valve conforming to ASTM-A-126, U.L. Listed and A.G.A. Approved for natural gas service with flanged ends, wrench operation, rated for 200 WOG service pressure and -20 to 200 degrees F., manufactured by Resun Model R-1431 or Nordstrom Model 143.
- d. Appliance/Equipment Shut-off Valves at local connections sizes 2 inches and smaller shall be bronze body, full port ball or butterfly type, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, quarter turn lever handle operation, rated for 175 W.O.G. service pressure and 30 to 275 degrees F., manufactured by Nibco Model T585-70-UL, Model T580-70-UL or Milwaukee Model BB2-100.
- e. Manual Emergency Shut-off Valves sizes 2 inches and smaller shall be bronze body, full port ball or butterfly type, U.L. Listed and A.G.A. Approved for natural gas service with threaded ends, quarter turn lever handle operation, rated for 175 W.O.G. service pressure and 30 to 275 degrees F., manufactured by Nibco Model T585-70-UL, Model T580-70-UL or Milwaukee Model BB2-100.
- f. Automatic Emergency Shut-off Valves shall be U.L. Listed F.M. Approved for natural gas service, 2-way electrically tripped solenoid type; fail safe closed; manual reset; Type 1 solenoid enclosure; NBR seals and disc; stainless steel core tube and springs; copper coil; manufactured by ASCO Red Hat Series 8044 or approved equal.

2.4 PRESSURE REGULATORS

- a. All pressure regulators shall be designed, manufactured and approved for natural gas service.
- b. Pressure regulators for individual service lines shall be capable of reducing

distribution line pressure to pressures required for users. Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Regulator shall have a single port with orifice diameter no greater than that recommended by manufacturer for the maximum gas pressure at the regulator inlet. Regulator vent valve shall be of resilient materials designed to withstand flow conditions when pressed against valve port. Regulator shall be capable of limiting build-up of pressure under no-flow conditions to 50 percent or less of the discharge pressure maintained under flow conditions. Commercial grade diaphragm type with internal relief valve, vent valve, cast iron body, Buna-N diaphragm. Manufactured by Rockwell or Fisher or approved equals.

- c. Install pressure gauge adjacent to and downstream of each line pressure regulator.

2.5 UNIONS

- a. Unions in 2 inches and smaller in ferrous lines shall be right and left hand nipple/coupling assembly, or ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends, 2-1/2 inches and larger shall be ground flange unions. Companion flanges on lines at various items of equipment, machines and pieces of apparatus may serve as unions to permit disconnection of piping.

- b. Unions connecting ferrous pipe to copper or brass pipe shall be dielectric type.

- c. Above grade flexible stainless steel appliance/equipment connectors shall conform with AGA under the ANSI Z21.69 Standard. Hose shall be braided stainless steel with a polyolefin heat-shrink tubing with high flame-retardant qualities. Hose shall be equipped with malleable iron unions and spring loaded brass quick-link couplings. An easily accessible manual shut-off valve shall be installed ahead of all hose connections. Specify T&S Brass "Safe-T-Link" or approved equal.

2.6 FLANGES

- a. All 150 lb. and 300 lb. ANSI flanges shall be domestically manufactured, weld neck forged carbon steel, conforming to ANSI B16.5 and ASTM A 181 Grade I or II or A 105 71. Slip on flanges shall not be used. Each fitting shall be stamped as specified by ANSI B16.9 and, in addition, shall have the laboratory control number stenciled on each fitting for ready reference as to physical properties and chemical composition of the material. Complete test reports may be required for any fitting selected at random. Flanges which have been machined, remarked, painted or otherwise produced domestically from imported forges will not be acceptable. Flanges shall have the manufacturer's trademark permanently identified in accordance with MSS SP 25. Contractor shall submit data for firm certifying compliance with these Specifications. Bolts used shall be carbon steel bolts with semi finished hexagon nuts of American Standard Heavy dimensions. All thread rods will not be an acceptable for flange bolts. Bolts shall have a tensile strength of 60,000 psi and an elastic limit of 30,000 psi. Flat-faced flanges shall be required to match flanges on pumps, check valves, strainers, etc. Only one manufacturer of weld flanges will be approved for each project.

- b. All flanges shall be gasketed. Contractor shall place gasket between flanges of flanged joints. Gaskets shall fit within the bolt circle on raised face flanges and shall be full face on flat face flanges. Gaskets shall be cut from 1/16 inch thick, non metallic, non asbestos gasket material suitable for operating temperatures from 150 degrees F to +75 degrees F, Klingersil C-

4400, Manville Style 60 service sheet packing, or approved equal.

PART 3: EXECUTION

3.1 PREPARATION

- a. Ream pipe ends and remove cutting burrs. Bevel plain end ferrous pipe.
- b. Remove cutting oil, scale and dirt, on inside and outside of piping, before assembly.

3.2 EQUIPMENT CONNECTIONS

a. Provide specified connections, shutoff valves, regulators and unions at each and every appliance and piece of equipment requiring natural gas, including equipment furnished under other Divisions of these Specifications and/or by the Owner.

b. Provide and install union type connections at all equipment to permit removal of service piping.

c. Gas service connections shall have a diameter at least one pipe size larger than that of the inlet connection to the equipment as provided by the manufacturer and be of adequate size to provide the total input demand of the connected equipment.

d. Provide listed and labeled appliance connectors complying with ANSI Z21.69 and listed for use with food service equipment having casters, or that is otherwise subject to movement for cleaning, and other large movable equipment. Connectors shall have listed and labeled quick-disconnect devices and shall have retaining cables attached to structures and equipment. Connectors shall not be concealed within or extended through wall, floor or partition and shall be located entirely in the same room as the connected equipment. Provide an accessible shut-off valve not less than the nominal size of the equipment connector, immediately ahead of the connector.

e. Rigid metallic pipe and fittings shall be used at service connections to all stationary equipment.

3.3 INSTALLATION

a. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

b. All installation shall be in accordance with manufacturer's published recommendations.

c. Provide support for and connections to natural gas service meter in accordance with requirements of the utility company.

d. All installation shall be in accordance with manufacturer's published recommendations.

e. Distribution piping shall be as short and as direct as practicable between the point of delivery and the outlets.

f. All above ground gas piping shall be electrically continuous and bonded to electrical system ground conductor in accordance with NFPA 70.

g. Provide and install union type fittings at proper points to permit dismantling or removal of pipe. No unions will be required in welded lines except at equipment connections. Where union type fittings are necessary for piping dismantling purposes, right and left nipples and couplings shall be used. Flanges, ground-joint unions or approved flexible appliance connectors may be used at exposed fixture, appliance or equipment connections.

h. Provide dielectric isolation device where copper lines connect to ferrous lines or equipment, such as dielectric coupling or dielectric flange fitting.

i. Valves, regulators, flanges, union type fittings and similar appurtenances shall be accessible for operation and servicing and shall not be located above ceilings, within chases, walls/partitions, spaces utilized as return air plenums or non-accessible locations.

j. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

k. Close nipples, bushing and cross type fittings shall not be installed in any gas piping system.

l. Slope piping and arrange to drain at low points. Install drip/sediment traps at points where condensate and debris may collect. Locate drip/sediment traps where readily accessible for cleaning and emptying. Do not install where condensate would be subject to freezing. Construct drip/sediment traps using tee fitting with capped nipple connected to bottom outlet. Use minimum-length nipple of 3 pipe diameters, but not less than 4 inches long, and same size as connected pipe. Cap shall be screwed pattern, black, standard weight, malleable iron. Install with adequate space for removal of cap.

m. Provide adequate clearance for access to and operation of all valves.

n. Install valves with stems upright or horizontal, not inverted unless required otherwise by the valve manufacturer.

o. Pipe vents from gas pressure reducing valves and pipe casing sleeves to the exterior of the building and terminated with outlet turned down and capped with corrosion resistant insect screen. Vent terminations shall be at least seven feet above grade or pedestrian traffic and a minimum three (3) feet above or twenty five (25) feet horizontally from all air intakes or building openings.

p. Above ground horizontal natural gas and encasement piping shall be supported at intervals of no greater than 6 foot for 1/2 inch piping, 8 foot for 3/4 inch and 1 inch piping and 10 foot for 1-1/4 inches and larger piping. Vertical piping shall be supported at each floor level and at intervals as specified for horizontal piping.

q. Extension bars shall not be used for supporting gas or encasement piping. Gas or

encasement piping shall not be used to support any other piping or component.

End of Section

SECTION 22 4000

PLUMBING FIXTURES

PART 1: GENERAL

1.1 DESCRIPTION:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all work in this Section.

b. The Contractor shall furnish and install all plumbing fixtures complete with all equipment, fittings, trimmings and supports as specified.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 FIXTURES:

a. All fixtures shall be Grade "A". The name or trademark of the manufacturer shall be printed or pressed on all water closets and lavatories and a label, which cannot be removed without destroying it, containing the manufacturer's name and trademark and the quality of the fixtures, shall be affixed to all fixtures. Products shall be by manufacturers indicated on the drawings or approved equals by:

Lavatories, water closets And Sinks	Kohler Eljay Crane
Faucets	T & S Brass, Zurn, Moen
Flushg Valves	Delany, Zurn, Sloan
Cleanouts	MIFAB
Floor Drains	MIFAB
Shock absorbers	Smith, Watts

Additional products will be considered for approval in accordance with prior approval provisions of the specifications.

- b. Exposed metal parts of fixtures shall be chromium plated. Where fixtures are to be hung from the wall, the fixture or fixture hanger shall be supported by concealed 3" steel washers and through bolts. Furnish traps and supply fittings with stops for all fixtures.
- c. All faucets and supply fittings shall be of the same manufacturer as the fixture except as noted otherwise. All exposed supply and waste piping shall be chrome plated. Supply piping serving flush valves shall be equipped with chrome plated pipe cover.
- d. Fixtures shall be white or stainless steel as indicated on drawings.
- e. Direct connections between domestic water system and sanitary waste system will not be permitted.
- f. All enameled cast iron fixtures shall be Acid Resisting (AR) and shall bear manufacturer's symbol signifying AR materials.
- g. All flush valves shall be quiet acting, non-hold open feature and shall have sweat solder adaptor kit. Escutcheon shall be chrome plated brass with set screws.
- h. Threaded adaptors serving lavatory supply piping shall be concealed in walls. Runouts to fixture shall be chrome plated brass pipe.
- i. All exposed waste piping serving fixtures, except service sinks, shall be 17 gauge chrome plated brass pipe with cast brass P-trap. Under Counters will be considered exposed areas.
- j. Cut-Off Stops: All fixtures shall have individual loose key cut-off stops on cold and/or hot water lines except as specified hereinafter or indicated on the drawings.
- k. Provide appropriate wall hangers for all wall-hung fixtures.

PART 3: EXECUTION

3.1 GENERAL:

- a. Install all fixtures as per manufacturer's requirements and local codes.

End of Section

SECTION 23 0500

COMMON WORK RESULTS FOR HVAC

PART 1: GENERAL

1.1 SCOPE:

a. Applicable requirements of the General Conditions, Supplementary General Conditions, and Special Conditions bound at the front of these specifications shall govern work under this heading.

b. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere in order to assure a complete and satisfactory installation. Work such as excavation, backfill, concrete, flashing, wiring, etc., which is required by the work of this section shall be performed in accordance with the requirements of the applicable section of the specifications.

c. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the word "provide" is used, it shall mean "furnish and install complete and ready for use".

d. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

e. This Contractor is referred to the General and Special Conditions of the Contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.

f. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

g. Please refer to coordination process requirements in Division 1

1.2 DEFINITION:

a. The word "Contractor" as used in this section of the specification refers to the HVAC, Plumbing and Fire Protection Contractors unless specifically noted otherwise. The word "provide" means furnish, fabricated, complete, install, erect, including labor and incidental materials necessary to complete in place and ready for operation or use the item referred to or described herein and/or shown or referred to on the Contract Drawings.

1.3 CONTRACTOR'S QUALIFICATIONS:

a. It is assumed that the Contractor has had sufficient general knowledge and experience to anticipate the needs of a construction of this nature. The Contractor shall furnish all items required to complete the construction in accordance with reasonable interpretation of the intent of the Drawings and Specifications. Any minor items required by code, law or regulations shall be provided whether or not specified or specifically shown where it is a part of a major item of equipment, or of the control system specified or shown on the plans.

PART 2: PRODUCTS

2.1 MATERIALS AND WORKMANSHIP:

a. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Architect shall be furnished.

b. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers and labor required to unload, transfer, erect, connect-up, adjust, start, operate and test each system.

c. Unless otherwise specifically indicated on the plans or specifications, all equipment and material shall be installed with the approval of the Architect in accordance with the recommendations of the manufacturer. This shall include the performance of such tests as the manufacturer recommends.

d. All work must be done by first-class and experienced mechanics properly supervised and it is understood that the Architect has the right to stop any work that is not being properly done and has the right to demand that any workman deemed incompetent by the Architect be removed from the job and a competent workman substituted.

2.2 EQUIPMENT APPLICATION AND PERFORMANCE:

a. The Contractor and/or Equipment Supplier shall be responsible to see that equipment supplied is correct for the intended application and will perform within the limits of capacity, noise, life expectancy, pressure drop and space limitations intended for that equipment as shown on the plans or described in the specifications. The shop drawings shall show the capacity and operating characteristics of the equipment.

2.3 EQUIPMENT DEVIATIONS:

a. Where the Contractor proposes to use an item of equipment other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical, or architectural layout, all such redesign, and all new drawings and detailing required therefor, shall be prepared by the Subcontractor at his own expense and submitted for approval by the Architect.

b. Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, conduit, and equipment from that specified or indicated on the drawings, the Contractor shall furnish and install any such ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit, and any other additional equipment required by the system, at no additional cost to the Owner.

2.4 MOTORS:

a. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C40 and conform thereto for installation resistance and dielectric strength. Each motor shall be provided with conduit terminal box, adequate starting and protective equipment as specified or required. The capacity shall be sufficient to operate associate driven devices under all conditions of operation and load and without overload, and at least shall be the horsepower indicated or specified. Each motor shall be selected for quiet operation. All 3-phase motors be NEMA MG-1 Premium Efficiency rated.

2.5 DRIVES:

- a. Machinery drives shall be provided for all power driven equipment specified in this section.
- b. Drives shall be V-belt and shall be selected to overcome the starting inertia of the equipment without slippage, but in no case shall be less than 150% of the full motor load. Drives 1/2 HP and smaller may be provided with single belts. Drives 3/4 HP and larger shall be provided with the number of belts necessary to transmit the required power with 95% minimum efficiency.
- c. Where adjustable type sheaves are indicated they shall be selected such that the schedule speed of the driven equipment is at the midpoint in the adjustment range of the sheave.
- d. Where fixed type sheaves are indicated the Contractor shall include in his price changing sheave sizes once during the balancing period to achieve proper air quantities.
- e. Sheaves shall be machined cast iron of the same manufacturer as the belt provided. Shop drawings shall be submitted of each drive which shall include actual transmission capacity of each drive.

All exposed belt drives to have belt guards

2.6 FOUNDATIONS, SUPPORTS, PIERS, ATTACHMENTS:

- a. This Contractor shall furnish and install all necessary foundations, supports, pads, bases and piers required for all air conditioning equipment, piping, pumps, tanks, compressors, and for all other equipment furnished under this contract, and shall submit drawings to the Architect for approval before purchase, fabrication or construction of same.
- b. For pumps, compressors, and other rotating machinery and for all equipment where foundations are indicated, furnish and install concrete pads minimum 4 inches thick or as shown. All pads shall be extended six (6) inches beyond machine base in all directions with top edge chamfered. Insert six (6) inch long, 1/2" round steel dowel rods at 12" on center into floors to anchor pads. Shop drawings for all foundations and pads shall be submitted to the Architect for approval before same are constructed.
- c. Construction of foundations, supports, pads, bases, and piers where mounted on the floor, shall be of the same materials and same quality of finish as the adjacent and surrounding flooring material.
- d. All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner. Attachments shall be of a strong and durable nature and any attachments that are, in the opinion of the Architect, not strong enough shall be replaced as directed.

2.7 VIBRATION ISOLATION:

- a. All work shall operate under all conditions of loads without any sound or vibration which is objectionable in the opinion of the Architect. If requested, the Contractor shall record sound power level readings in all areas adjacent to mechanical rooms, over, under or beside, after all equipment is fully operational and all wall and ceiling systems are completed. Sound level readings shall not exceed NC levels as recommended in Table 23, Chapter 35 of ASHRAE Handbook and Product Directory.
- b. The readings are to be tabulated in the Maintenance and Operating Instruction Booklets.
- c. Sound or vibration conditions in excess of listed quantities shall be corrected in an approved manner by the Contractor at his expense.

d. Unless otherwise noted mechanical equipment over one horsepower shall be isolated from the structure with resilient vibration and noise isolators supplied by one manufacturer to the Mechanical Contractor. Where isolator type and required deflection are not shown, equipment shall be isolated in accordance with the latest ASHRAE Handbook and Product Directory, Chapter 32, Table 30. Submittals shall include complete design for the equipment bases, a tabulation of the design data for the isolators, including lateral stiffness, O.D., free operating and solid height of the spring isolators, free and operating height of the neoprene or fiberglass isolators. Selection of isolators for proper loading to obtain desired efficiency shall be the responsibility of the manufacturer of isolating units to suit the equipment being supplied on the job and shall be fully guaranteed by this supplier. All vibration isolation equipment complete with thorough selection data shall be submitted. Units shall be Vibration Eliminator Company, Mason, Peabody, or approved equal.

e. Flexible duct connections shall be provided at inlet and outlet of all fans or cabinets containing fans and shall be constructed such as to allow a minimum movement of 2 inches in any direction and will not restrict normal movement of any equipment.

2.8 DIELECTRIC CONNECTIONS:

a. Dielectric connections shall be used at any points within the piping systems where dissimilar metals meet. Careful attention shall be given to support brackets and hangers to select proper materials to avoid dissimilar metal contact at these points.

2.9 DRAINS AND VENTS:

a. In addition to the drains and vents indicated on the plans and piping details, the Contractor shall install additional drains and vents as required to remove all water and air from the piping systems.

2.10 MOTOR STARTERS AND DISCONNECTS:

a. Individual motor controllers complete with auxiliary contacts, control transformers, push buttons, selector switches and remote push button stations not specifically specified to be furnished with the equipment shall be provided under this section. Motor controllers shall comply with NEMA Standards and be complete with proper size heaters and auxiliary contacts and shall be in NEMA enclosures as required. Unless otherwise noted, push button stations shall be oil-tight heavy duty type. Controllers shall be manual, magnetic, or combination type with disconnect switch or circuit breaker as indicated on the drawings or where required by the NEC. Controllers shall include motor overcurrent protection in each phase conductor. Each motor controller shall be provided with phenolic nameplate, black with 1/4" high letters and white border, indicating equipment served, attached using counter sunk screws.

b. The Electrical Contractor shall furnish and install all disconnecting switches unless otherwise indicated or specified. Where disconnecting switches are indicated to be furnished under this Section, they shall be General Electric, Type TH in NEMA 1 enclosures, with voltage and amperage rating appropriate to the application. Unless otherwise noted, fuses shall be Buss "Fusetrons", or approved equal. Unfused motor disconnecting switches shall be Type TH in NEMA 1 or 4 applicable enclosures. Similar and equivalent equipment as manufactured by I.T.E., Square D, or Westinghouse is equally acceptable. Switches used as service switches shall bear such U.L. Label and nameplate on switch shall so indicate.

2.11 PAINTING:

a. Paint material shall be equal to the products listed below and, insofar as practical, products of only one manufacturer shall be used. Contractor shall submit to the Architect the listed manufacturer he proposes to use in the work. Should the Contractor desire to use products of a manufacturer not listed

below, or products made by a listed manufacturer but not scheduled herein, Contractor shall submit complete technical information on the proposed products to the Architect for approval. Only products approved by the Architect shall be used. Manufacturer and model numbers cited are for reference only. It is not the intent of this specification to limit the bidding to the manufacturers cited. Bidders may use products from other manufacturers subject to the prior approval provisions of the specifications.

1. Rust Inhibitive Primer:

- a. Devoe (or approved equal): Ready-Mixed Red
- b. Duron(or approved equal): Deluxe Red Primer.
- c. Glidden(or approved equal): Rustmaster Tank and Structure Primer.
- d. Pittsburgh(or approved equal): Inhibitive Red Primer.

2. Galvanized Metal Primer:

- a. Devoe(or approved equal): Devoe Zinc Dust Primer.
- b. Duron(or approved equal): Duron Deluxe Galvanized Metal Primer
- c. Glidden(or approved equal): Rustmaster Galvanized Iron Metal Primer.
- d. Pittsburgh(or approved equal): Speedhigh Galvanized Steel Primer.

2.12 FLOOR OPENINGS:

a. Openings in floors of mechanical rooms (duct and piping) are to be curbed with 4" high curbs in accordance with USC Design Standards.

PART 3: EXECUTION

3.1 DUTIES OF CONTRACTOR:

a. Contractor shall furnish and install all materials called for in these Specifications and accompanying drawings, and must furnish the apparatus complete in every respect. Anything called for in the specifications and not shown on the drawings or shown on the drawings and not called for in the specifications, must be furnished by the Contractor.

b. Contractor is responsible for familiarizing himself with the details of the construction of the building. Work under these specifications installed improperly or which requires changing due to improper reading or interpretation of building plans shall be corrected and changed as directed by the Architect without additional cost to the Owner.

c. The Contractor shall follow drawings in laying out work and check drawings of other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. Where headroom or space condition appear inadequate, Architect shall be notified before proceeding with installation.

d. The plans are diagrammatic and are not intended to show each and every fitting, valve, pipe, pipe hanger, or a complete detail of all the work to be done; but are for the purpose of illustrating the type of system, showing pipe sizes, etc., and special conditions considered necessary for the experienced mechanic to take off his materials and lay out his work. This Contractor shall be responsible for taking such measurements as may be necessary at the job and adapting his work to local conditions.

e. Conditions sometimes occur which require certain changes in drawings and specifications. In the event that such changes in drawings and specifications are necessary, the same are to be made by the Contractor without expense to the Owner, providing such changes do not require furnishing more materials, or performing more labor than the true intent of the drawings and specifications demands. It is understood that while the drawings are to be followed as closely as circumstances will permit, the Contractor is held responsible for the installation of the system according to the true intent and meaning of the drawings. Anything not entirely clear in the drawings and specification will be fully explained if application is made to the Architect. Should, however, conditions arise where in the judgment of the Contractor certain changes will be advisable, the Contractor will communicate with the Architect and secure his approval of these changes before going ahead with the work.

f. The right to make any responsible change in location of apparatus, equipment, routing of piping up to the time of roughing in, is reserved by the Architect without involving any additional expense to the Owner.

g. It shall be the duty of prospective Contractors to visit the job site and familiarize themselves with job conditions. No extras will be allowed because of additional work necessitated by, or changes in plans required because of evident job conditions, that are not indicated on the drawings.

h. Contractor shall determine the schedule of work as laid down by the General Contractor and must schedule his work to maintain the building construction schedule so as not to interfere with or hold up any other Contractors.

i. Contractor shall leave the premises in a clean and orderly manner upon completion of the work, and shall remove from the premises all debris that has accumulated during the progress of the work.

3.2 CODES, RULES, PERMITS AND FEES:

a. The Contractor shall give all necessary notices, obtain all permits and pay all sales taxes, fees and other costs, including utility connections or extensions, in connection with his work; file all necessary plans prepare all documents and obtain all necessary approvals of all authorities having jurisdiction. Obtain all required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment of the work.

b. The Contractor shall include in his work, without extra cost to the Owner, any labor, materials, service, apparatus, drawings, in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on drawings and/or specified.

c. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, international building code, International Plumbing Code, International Mechanical Code, International Energy Conservation Code, International Fuel Gas Code (2009) and with the requirements of all governmental departments having jurisdiction.

d. All materials and equipment for the electrical portion of the mechanical system shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc..

e. All work shall be done in accordance with the International Building Code, and requirements of governmental agencies having jurisdiction.

f. It shall be the responsibility of this Contractor to complete installation of the specified fired and unfired pressure vessels, and their safety devices, in accord with requirements of the State of South Carolina. Contractor shall have the equipment which is installed under this contract inspected and approved by the State of South Carolina. Contractor shall be responsible for notifying State Boiler

Inspector in writing at least two weeks prior to date of completion of all equipment requiring inspection.

g. Furnish and install a suitable metal frame, having a removable glass cover, for posting certificates of inspection furnished by the State of South Carolina. Certificates are to be installed in frames by this Contractor before requesting final inspection of complete job by the Owner and Architect. Final payment will not be made until such certificate has been duly posted. All fees or expenditures necessary for this requirement shall be paid by this Contractor.

3.3 COOPERATION WITH OTHER TRADES:

a. This Contractor shall give full cooperation to other trades and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

b. Where the work of the Contractor will be installed in close proximity to, or may interfere with the work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Architect, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than $3/8" = 1'-0"$, clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination with other trades, or so as to cause any interference with work of other trades, he shall make the necessary changes in his work to correct the condition without extra charge.

c. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

3.4 RECORD DRAWINGS:

a. The Contractor shall furnish drawings showing dimensioned location and depths of all exterior piping and structures, and shall indicate any and all changes in location of piping, ductwork, equipment or valves from that shown on the Contract Drawings. The drawings shall consist of clean, legible sepia prints of the Contract Drawings on which the Contractor shall mark all notes, dimensions, sizes and information required. The sepias shall be kept for this purpose only. Before final inspection the Contractor shall submit to the Architect eight (8) sets of black line prints of the sepias.

3.5 SURVEYS AND MEASUREMENTS:

a. This Contractor shall base all measurements, both horizontal and vertical, from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

b. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Architect through the General Contractor, and shall not proceed with his work until he has received instructions from the Architect.

3.6 SAFETY REQUIREMENTS:

a. All systems shall be installed so as to be safe operating and all moving parts shall be covered where subject to human contact. All rough edges of equipment and materials shall be made smooth.

b. All safety controls shall be checked under the supervision of the Architect's representative and eight (8) copies of test data showing setting and performance of safety controls shall be submitted to the Architect. All pressure vessels shall be ASME stamped and shall have stamped relief valves. Water

heaters shall be provided with ASME stamped T & P relief valve.

c. O.S.H.A. requirements will be complied with.

d. An emergency shutoff switch shall be provided at the door to each equipment room containing oil or gas burners. Activation of the switch shall cause each burner within that equipment room to cease operation.

3.7 SHOP DRAWINGS:

a. Contractor shall submit within ten (10) days after award of contract eight (8) copies of a complete list of all manufacturers to be used on the job. No substitutions will be allowed after this date except in extenuating circumstances as determined by the Architect.

b. Submission of a manufacturer's name or equipment number on this list shall not be considered as equipment approved by the Architect.

c. The Contractor shall submit for approval eight (8) sets of detailed shop drawings of all equipment and all material required to complete the project, and no materials or equipment may be delivered to the job site or installed until the Contractor has in his possession the approved shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. The Contractor shall furnish the number of copies required by the General and Special Conditions of the Contract, but in no case less than eight (8) copies.

d. Prior to delivery of any material to the job site, and sufficiently in advance of requirements to allow the Architect ample time for checking, submit for approval detailed, dimensioned drawings or cuts, showing construction, size, arrangement, operating clearances, performance, characteristics and capacity. Each item of equipment proposed shall be standard catalog product of an established manufacturer and of equal quality, finish, performance, and durability to that specified.

e. Samples, drawings, specifications, catalogs, submitted for approval, shall be properly labeled indicating specific service for which material or equipment is to be used, Section and Article number of specification governing, Contractor's Name and Name of Job.

f. Catalogs, pamphlets, or other documents submitted to describe items on which approval is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly marked. Data of a general nature will not be accepted. Data shall include eight (8) copies of computation sheets indicating how unit capacity was determined where ratings are at other than standard conditions. No payment for any equipment or labor will be allowed until all major pieces of equipment specified have been submitted to the Architect for approval.

g. The Contractor, as part of the shop drawing submitted, shall submit shop drawing of all ductwork for the project including the risers, takeoffs to the floors with their associated dampers, bottom of duct elevations, and ells with unequal legs showing turning vanes. Shop drawings to show complete assembled duct system on floor plans at minimum 1/8" per foot scale.

h. Static pressure drops across fittings, dampers, heaters, attenuators, etc. shall not exceed minimum ASHRAE Standards when not specified.

i. The submittal of shop drawings shall be with the Contractor stamp affixed, this shall assure the Engineer that they are being submitted in accordance with Sub-Paragraph 4.13.4 in AIA Document A201 and/or Paragraph 6.26, in NSPE Document 1910-8. This stamp indicates that the Contractor, by approving and submitting shop drawings, represents that he has determined and verified all field Common Work Results for HVAC

measurements and quantities, field construction criteria, material, catalog material, and similar data that he has reviewed and coordinated information in the shop drawings with the requirements of the work and the Contract Documents. It, also, indicates that any deviation from the Contract Documents has been shown on the submittal and clearly defines the deviations from the specifications.

j. Approval rendered on shop drawings shall not be considered as a guarantee of quantities, measurements, or building conditions. Where drawings are approved, said approval does not mean that drawings have been checked in detail: said approval does not in any way relieve the Contractor from his responsibilities or necessity of furnishing material or performing work as required by the contract drawings and specifications.

k. Failure of the Contractor to submit shop drawings in ample time for checking shall not entitle him to an extension of Contract time, and no claim for extension by reason of default will be allowed.

l. All shop drawings and submittals are to be in the office of the Architect within 30 days after the Contracts have been awarded. Contractor shall be financially responsible for any price increase of shop drawing items from the time these drawings are issued until they are returned to the Contractor for purchase of items.

m. Contractor shall keep on the job at all times copies of all approved shop drawings.

3.8 OBSERVATION:

a. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect at least 72 hours in advance when any work to be covered up is ready for inspection. No work will be covered up until after observation has been completed on such items as piping and insulation, etc..

3.9 PERMITS, INSPECTION FEES, ETC.:

a. Contractor shall obtain and pay for all permits required, give all legal notices and pay all fees for inspection or otherwise required for the work.

b. It shall be the responsibility of this Contractor to complete installation of the specified fired and unfired pressure vessels, and their safety devices, in accord with requirements of the State of South Carolina. Contractor shall have the equipment which is installed under this contract inspected and approved by State of South Carolina, Contractor shall be responsible for notifying State Boiler Inspector in writing at least two weeks prior to date of completion of all equipment requiring inspection.

c. Furnish and install a suitable metal frame, having a removable glass cover, for posting certificates of inspection furnished by the State of South Carolina. Certificates are to be installed in frames by this Contractor before requesting final inspection of complete job by the Owner, and Architect.

d. Final payment will not be made until such certificate has been duly posted. All fees or expenditures necessary for this requirement shall be paid by this Contractor.

3.10 ACCESSIBILITY:

a. Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with the General Contractor and all other Contractors whose work is in the same space, and shall advise the General Contractor of his requirements. Such spaces and clearances shall; however, be kept to the minimum size required.

b. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to valves, traps, cleanouts, motors, controllers, switch-gear, and drain points. If required for better accessibility, furnish access doors for this purpose. Minor deviations from drawings may be made to allow for better accessibility and any change shall be submitted for approval.

c. The Contractor shall provide the General Contractor with exact locations of access panels for each concealed valve, control damper or other device requiring service. Access panels shall be provided and installed by the General Contractor and as specified in the Architectural sections of the specifications. Locations of these panels shall be submitted in sufficient time to be installed in the normal course of work.

3.11 CONCEALED PIPE:

a. In general, all pipe in finished spaces shall be run concealed in floors, walls, partitions and above ceilings.

b. Concealment of pipe and covering of same shall not be done until authorized by the Architect, after proper tests have been made. This applies to all interior work and exterior work.

3.12 CUTTING AND PATCHING:

a. This Contractor shall provide all cutting and patching necessary to install the work specified in this section.

b. No structural members shall be cut without the approval of the Architect and all such cutting shall be done in a manner directed by him.

c. This Contractor shall arrange for proper openings in building to admit his equipment. If it becomes necessary to cut any portion of building to admit his equipment, portions cut must be restored to their former condition by this Contractor through agreeable arrangement with the General Contractor.

d. The General Contractor will provide all openings or chases in masonry or concrete; however, it is this Contractor's responsibility to advise exact dimensions, shape and locations of openings required in sufficient time for the General Contractor to make the necessary provisions. This Contractor shall be responsible for correct size and location of each opening for his equipment even though these openings are provided by the General Contractor.

3.13 SLEEVES AND PLATES:

a. This Contractor shall provide and locate all sleeves and inserts required before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where sleeves and inserts were not installed, or where incorrectly located. This Contractor shall do all drilling required for the installation of his hangers.

b. Sleeves shall be provided for all mechanical piping passing through concrete floor slabs and concrete, masonry, tile and gypsum wall construction. Sleeves shall not be provided for piping running imbedded in concrete or in insulating concrete slabs on grade.

c. Where sleeves are placed in exterior walls below grade, the space between the pipe or conduit and the sleeves shall be packed and made completely watertight.

d. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe. Where sleeves pass insulated pipes, the sleeves shall be

large enough to pass the pipe and insulation. Check floor and wall construction finishes to determine proper length of sleeves for various locations; make actual lengths to suit the following:

1. Terminate sleeves flush with walls, partitions and ceiling.
 2. In areas where pipes are concealed, as in chases, terminate sleeves flush with floor or as shown on the plans.
 3. In all areas where pipes are exposed, extend sleeves 1/4 inch above finished floor, except in rooms having floor drains, where sleeves shall be extended 3/4 inches above floor.
- e. Sleeves shall be constructed of schedule 40 black steel pipe unless otherwise indicated on the drawings. Sleeves through concrete beams shall be constructed as indicated on the drawings.
- f. Fasten sleeves securely in floor, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster, or other materials being forced into the space between pipe and sleeve during construction.
- g. Where piping penetrates fire rated floors or walls, penetrations shall be sealed with a U.L. approved fire stopping system. System shall be as manufactured and detailed by 3M Company or approved equal.
- h. Escutcheon plates shall be provided for all exposed pipes and all exposed conduit passing through walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing through sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

3.14 UTILITIES:

- a. This Contractor shall bear the cost of utilities required to perform the work under this Contract. Where services such as electricity, hoist, etc. are provided by the General Contractor, he shall be responsible directly to the General Contractor for his portion of the utilities as may be agreed upon.

3.15 SCAFFOLDING, RIGGING, HOISTING:

- a. This Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

3.16 EXCAVATING AND BACKFILLING:

- a. Each trade shall perform all excavation and backfill required for the installation of its work.
- b. Particular care shall be taken not to disturb or damage work of other Contractors.
- c. Mass excavation to approximate levels will be carried out under a section of the architectural specifications. The Contractor shall, however, do all trench and pit excavation and backfilling required for work under this section of the specifications, inside and outside the building, including repairing of finished surfaces and all required shoring, bracing, pumping and all protection for safety of persons and property. State and OSHA Safety Codes shall be strictly observed. In addition, it shall be the responsibility of the Contractor to check the indicated elevations of the utilities entering and leaving the building. If such elevations require excavations lower than the footing levels, the Architect shall be notified of such conditions and a redesign shall be made before excavations are commenced. It is also

the responsibility of the Contractor to make the excavations at the minimum required depths in order to avoid undercutting the footings.

d. No backfilling shall be done until work involved has been tested and approved by the Architect.

e. Contractor shall schedule excavation work so as not to unduly interfere with work of other trades on the job. Contractor shall be responsible for establishing all lines and grades required for proper location of his work.

f. When rock is encountered in excavation, it shall be paid for as outlined under the architectural section of these specifications.

g. In backfilling pipe trenches, approved fill shall first be compacted firmly and evenly on both sides of pipe in 6" layers to a depth of 12" over the top of the pipe. Remainder of trench shall be backfilled to established grade in 6" layers. Compact between each layer with a high-frequency vibrator tamper such as Dart Soil Compactor (as manufactured by Dart Manufacturing Company, Denver, Colorado). Fill shall be compacted to density specified under Earth Work Section of specifications for specified area through which trench passes. Compact fill to 95% maximum density at optimum moisture content all other areas. Earth bearing pressure as indicated shall be verified by a testing laboratory, which following the criteria specified for foundation wall trench, etc. in the Earth Work Section of the specifications. The reports shall be forwarded to the Architect for approval unless otherwise specified, the cost will be borne by this contractor, before any work is performed. If the earth bearing pressure is less than that required, the Contractor shall not begin additional work until notified by the Architect to do so. A copy of the report shall be forwarded to the Architect in triplicate.

h. Excess earth shall be distributed on premises as directed by the Architect.

i. Where ditches occur outside the building, the surface shall be finished to match existing surfaces. Any existing work, or work of other trades which is damaged or disturbed shall be repaired or replaced, and left in good order.

3.17 ELECTRICAL CONNECTIONS:

a. The Electrical Contractor shall furnish and install all wiring except: (1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Electrical Contractor shall receive from the Mechanical Contractor and mount all individually mounted motor starters and provide all power wiring to the motor terminals unless otherwise indicated. The Electrical Contractor will provide branch circuit protection and disconnects unless otherwise indicated or specified. The Mechanical Contractor shall provide all other control and protective devices, and perform all control and interlock wiring required for the operation of the equipment. Power wiring, from nearest panel, for control components (dampers, panels, etc.) shall be provided by the Mechanical Contractor unless specifically called for by Division 16.

b. After all circuits are energized and complete, the Electrical Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of this Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.

c. It shall be the responsibility of this Contractor to check with the Electrical Contractor on service outlets provided for this Contractor, to determine that the switches and wiring provided are of adequate size to meet Code requirements for this Contractor's equipment. Any discrepancy shall be brought to the attention of the Architect before work is installed. Otherwise, any cost for changes shall be at the expense of this Contractor, and in any case electrical cost increase due to equipment substitution

of different electrical characteristics shall be this Contractor's expense.

3.18 PIPE WORK:

a. All pipe work shown on the drawings and/or specifications or implied herein and required for a complete and operating system shall be done by experienced mechanics in a neat and workmanlike manner and subject to the approval of the Architect.

b. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required and it shall be the responsibility of the Contractor to furnish and install all materials and equipment required for the operating systems.

c. The piping shall be installed as shown on the plans with strict conformity to the sizes listed and due provisions for expansion and contraction.

3.19 LUBRICATION:

a. All bearing, except those specifically requiring oil lubrication, shall be pressure lubricated. All lubrication points shall be readily accessible, away from locations dangerous to workmen. In areas where lubrication points are not readily accessible Contractor shall provide extended lubrication tubes to positions where lubrication can be easily accomplished. Pressure grease lubrication fittings shall be "Zerk-Hydraulic" type as made by the Stewart-Warner Corporation, or approved equal, for each type of grease required.

b. The Contractor shall furnish lubrication charts or schedules for each piece of equipment or machinery. The charts or schedules shall designate each point of lubrication. Eight (8) copies of charts and schedules shall be submitted to the Architect prior to final inspection and approved copies of each schedule and chart shall be framed by the Contractor in metal frames with glass front and installed in the Equipment Room.

3.20 PROTECTION:

a. The Contractor shall protect all work and material from damage, and shall be liable for all damage during construction.

b. The Contractor shall be responsible for work and equipment until all construction is finally inspected, tested and accepted. He shall protect work against theft, injury or damage; and shall carefully store material and equipment received on site which is not immediately installed. He shall close open ends of work including pipe, duct, or equipment with temporary covers or plugs during storage and construction to prevent entry of obstructing materials or dust and debris.

c. Provide a protective covering of not less than 0.004" thick vinyl sheeting (or a similar approved material) to be used in covering all items of equipment, immediately after the equipment has been set in place, (or if in a place of storage within the building under construction) to prevent the accumulation of dirt, sand, cement, plaster, paint or other foreign materials from collecting on the equipment and/or fouling working parts.

3.21 CLEANING:

- a. Clean from all exposed insulation and metal surfaces grease, debris or other foreign material.
- b. Chrome plated fittings, fixtures, piping and trim shall be polished upon completion.

3.22 LABELS AND INSTRUCTIONS:

- a. Label all switches and controls furnished under this Section with engraved bakelite permanent labels to indicate the function of each and the apparatus serviced.
- b. Post in the Equipment Room framed under glass the following:
 - 1. Lubrication instructions listing all equipment which requires lubrication, the type of lubricant to be used and the frequency of lubrication.
 - 2. Photostatic copy of wiring diagram of temperature controls.
 - 3. Step-by-step operating instruction for each piece of equipment with control sequence description.
- c. All units shall be marked with unit numbers in three inch high letters with unit designated numbers.
- d. A tabulation shall be made of each panel number and circuit number serving each air conditioning unit, fan or other device with electrical service. This list shall be prepared and be ready to turn over to inspectors prior to calling for final inspection.

3.23 VALVE TAGS AND SCHEDULE:

- a. Each valve shall be provided with an engraved black finish, phenolic valve tag indicating valve service and valve number. Tag lettering shall be at least 1/4" high etched white letters and bevelled white trim. Tags to be attached using brass chains.
- b. The Contractor shall submit eight (8) copies of valve charts indicating valve number, location, service, "normal" position, manufacturer, size and model number to the Architect for approval.
- c. Prior to final inspection an approved copy of each valve chart shall be framed by the Contractor in a metal frame with glass front and installed in the Equipment Room.

3.24 EQUIPMENT SERVICEABILITY:

- a. All equipment shall be serviceable. All equipment shall be installed so that it can be removed. All equipment in or connected to piping systems shall have valves to isolate this equipment from the piping system. This includes, but not necessarily limited to control valves, water heaters, sensors, switches, pumps, traps and strainers. Unions (screwed or flanged) shall be provided so that all equipment is removable.
- b. Equipment installed in walls, ceilings or floors shall be accessible for service or removal without cutting walls, etc..
- c. Equipment requiring periodic service shall be installed to allow clearance for service and have removable panels, access doors, etc. through which the service is to be performed.
- d. Elevated equipment shall have service platforms.

3.25 ACCEPTANCE OF EQUIPMENT:

- a. In the event that the Architect considers it impractical, because of unsuitable test conditions,

or some other factors, to execute simultaneous final acceptance of all equipment portions of the installation may be certified by the Architect for final acceptance when that portion of the system is complete and ready for operation.

b. Contractor shall make all necessary tests, trial operation balancing and balance tests, etc., as may be required as directed by the engineer to prove that all work under these plans and specification is in complete serviceable condition and will function as intended. Oil burners, gas burners, and water chillers shall be started by a representative of the equipment manufacturer. All costs of these procedures shall be borne by this Contractor.

c. Upon completion of all work the system shall be tested to determine if any excess noise or vibration is apparent during operation of the system. If any such objections are detected in the system or noisy equipment found, the Contractor shall be responsible for correcting same. Ducts, plenums and casings shall be cleaned of all debris and blown free of all particles of rubbish and dust before installing outlet faces. Equipment shall be wiped clean with all traces of oil, dust, dirt and paint spots removed. Temporary filters shall be provided for all fans that are operated during construction and after all construction dirt has been removed from the building, new filters shall be installed. Bearings shall be lubricated as recommended by the equipment manufacturer. All control valves and equipments shall be adjusted to setting indicated. Fans shall be adjusted to the speed indicated by the manufacturer to meet specified conditions.

3.26 GUARANTEE:

a. The Contractor shall guarantee the complete mechanical system against defect due to faulty materials, faulty workmanship or failure due to negligence of the Contractor. This guarantee will exclude normal wear and tear, maintenance lubrication, replacement of expendable components, or abuse. The guarantee period shall begin on the date of the final acceptance and shall continue for a period of 12 months during which time the Contractor shall make good such defective workmanship and materials and any damage resulting therefrom, within a reasonable time of notice given by the Owner.

b. The period of Guarantee for equipment driven by electrical motors, etc., shall be 12 months from the date of acceptance. Refrigeration compressors shall have a five (5) year warranty.

3.27 OPERATING AND MAINTENANCE INSTRUCTIONS:

- a. Submit 5 sets of complete operating and maintenance instructions.
- b. Bind each set in plain black vinyl-covered, hard back, 3-ring binder. Individual paper shall be Boorum and Pease Reinforced Ring Book Sheet, No. S-212-101 or equivalent.
- c. Organize material in the following format:
 1. Section I:
 - (a) Name of Project
 - (b) Address
 - (c) Owner's Name
 - (d) General Contractor's Name and Address
 - (e) Mechanical Subcontractor's Name and Address
 - (f) Control Subcontractor's Name and Address
 - (g) Warranty Dates

2. Section II:

- (a) Description of System

3. Section III:

- (a) Major Equipment List (name, manufacturer, serial no., H.P. and
- (b) Control Sequence Description
- (c) Routine Maintenance Instructions in Step-by-Step form
- (d) Lubrication Charts and Schedules
- (e) Valve Schedules
- (f) Test and Balance Reports
- (g) Sound Power Level Readings (where required)

4. Section IV:

- (a) Operating and Maintenance Instructions by Manufacturer
- (b) Shop Drawings (Major Requirement)
- (c) Wiring Diagrams
- (d) Control Drawings

3.28 PAINING:

- a. Painting shall be performed as detailed in Division 9.
- b. All surfaces to receive paint shall be dry and clean.
- c. Before priming, all surfaces shall be thoroughly cleaned of all dirt, oil, grease, rust, scale and other foreign matter. Cleaning shall be done with sandpaper, steel scraper, or wire brush where appropriate and necessary. Metallic surfaces which have been soldered shall be cleaned with benzol and all other metal surfaces washed with benzine.
- d. Mixing shall be in galvanized iron pans. Paint shall be mixed in full compliance with manufacturer's directions. Thinning shall be done only in full compliance with manufacturer's directions.
- e. Workmanship shall be highest quality, free from brush marks, laps, streaks, sags, unfinished patches, or other blemishes. Edges where paint joins other material or colors shall be sharp and clean without overlapping. Paint shall be brushed or sprayed on in strict compliance with manufacturer's directions and shall work evenly and be allowed to dry at least 48 hours before subsequent coating. Paint shall not be applied in damp or rainy weather or until surface has thoroughly dried. Contractor shall furnish and lay drop-cloths in all areas where painting is done as necessary to protect work of other trades. Varnish and enamel shall not be applied when temperature in the area is less than 60 degrees Fahrenheit nor paint when under 50 degrees Fahrenheit. Prior to final acceptance, Contractor shall touch up or restore any damaged finish. All insulation materials shall be provided with a paint suitable jacket.
- f. The following materials and equipment require painting as noted:
 - 1. All concealed piping, sheet metal, hangers and accessories except galvanized sheet metal or piping and tar coated cast iron piping:
 - (a) One coat rust-inhibitive primer except where exterior insulation is provided.
 - 2. All exposed, exterior and interior, piping, sheet metal, hangers and accessories, air handling units, chillers, pumps, etc. except galvanized sheet metal or piping and tar coated cast iron piping:

- (a) One coat rust-inhibitive primer except where exterior insulation is provided.
- 3. All concealed galvanized sheet metal, piping and accessories.
 - (a) One coat galvanized metal primer on threaded portions of piping and any damaged galvanized surfaces.
- 4. All exposed, exterior and interior galvanized sheet metal, piping and accessories.
 - (a) One coat galvanized metal primer except where exterior insulation is provided.
- 5. All tar coated cast iron piping, and accessories.
 - (a) Two coats tar coat paint on any damaged surfaces.
- 6. All exposed, exterior and interior, insulation equipment.
 - (a) Two coats exterior glass enamel over paint suitable insulation jacket.
- g. All piping in Equipment Rooms shall be painted and identified by stenciling with letters minimum 1/2" high in a contrasting color. Piping outside Equipment Rooms shall be stenciled. Stenciling shall occur at each change of direction and every 20 feet. Arrows should be placed adjacent to letters signifying direction of flow. Colors shall be as directed by the owner and according to the USC standards.

End of Section

SECTION 23 0553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL REQUIREMENTS

1.1 SCOPE OF WORK

a. General:

1. Furnish all labor, materials, tools and equipment and perform all operations in connection with the installation of mechanical identification on all mechanical equipment, systems, and appurtenances where shown on the drawings and specified hereinafter.

b. Description:

1. Exposed piping is any piping which is not concealed in walls, chases, or above ceilings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- a. In addition to this section, the Contractor shall refer to other specification sections and drawings to ascertain the extent of work including:

1. Section 23 0500 – Common Work Results for HVAC

1.3 QUALITY ASSURANCE

a. Codes and Standards:

1. All work furnished and installed shall comply with all local codes and ordinances and shall meet or exceed the standards and procedures (latest editions) of the following:
 - a. ANSI A13.1 for the identification of piping systems.
 - b. OSHA color standards.

b. Manufacturer:

1. The following mechanical tag, band, nameplate, and identification marker manufacturers (or approved equals) are acceptable:
 - a. Seton Name Plate Corporation
 - b. T&B/Westline Products
 - c. Brady

PART 2 - PRODUCTS

2.1 VALVES

- a. Attach to each valve, except shut off valves on plumbing fixtures, a 1-1/2" round brass tag stamped with designating number, and system type, i.e. Chilled Water (HCHW), Hot Water Supply & Return (HHW, HWR), Domestic Cold Water and Hot Water (DCW, DHW) 1" high filled in with black enamel.
- b. Plumbing and Heating Contractors shall coordinate valve numbering to avoid duplication.

2.2 NAMEPLATES

- a. Nameplates shall be fabricated on black lamacoid with beveled edges. Markings shall be cut thru to white background.
- b. Markings shall be 3/8" high minimum.
- c. All information shall be scribed on a single nameplate per device.

2.3 SWITCHES, THERMOSTATS AND OTHER DEVICES

- a. Devices to be identified include:
 - 1. Control panels.

2.4 PIPE CODING

- a. Apply color coded polyvinyl chloride pipe bands identifying service and direction of flow.
- b. Pipe identification sizing shall be:

<u>PIPE OR COVERING</u>	<u>FIELD INCHES</u>	<u>LENGTH OF COLORED SIZE OF LETTERS INCHES</u>
3/4 to 1-1/4	8	1/2
1-1/2 to 2	8	3/4
2-1/2 to 6	12	1-1/4
8 to 10	24	2-1/2
Over 10	32	3-1/2

- c. Flow direction arrows shall be black on color background. Show flow direction arrows immediately adjacent to all pipe identification markers.
- d. Markers shall be self-sticking type.
- e. Domestic hot water lines which are electrically heat traced shall have pipe labels located per specifications. Label shall state "Electric Traced."

2.5 LOCATION MARKERS

- a. Provide approved ceiling tile markers near removable ceiling panels to indicate the location of valves, concealed HVAC equipment, fire and smoke dampers, or other devices. Markers shall be adhesive type of various colors.

PART 3 - EXECUTION

3.1 PIPE CODING

- a. On exposed piping apply bands at 20 foot centers on straight runs, at valve locations, and at points where piping enters and leaves a partition, wall, floor or ceiling.
- b. On concealed piping installed above removable ceiling construction, apply bands in the manner for exposed piping.
- c. On concealed piping installed above nonremovable ceiling construction, or in pipe shafts, apply bands at valves or other devices that are made accessible by means of access doors or panels.
- d. Apply bands at exit and entrance points to each vessel, tank or piece of equipment.
- e. For insulated pipes apply bands after insulation and painting work has been completed.
- f. Follow manufacturer's instructions for application procedures using noncombustible materials and contact adhesives.
- g. Provide 10 additional bands of each type for Owner.

3.2 VALVES

- a. Securely fasten valve tag to valve spindle or handle with a brass chain or cable.
- b. Bind with metal clamp.
- c. Furnish to Owner's Representative three (3) complete framed plastic laminated valve tag schedules. Schedule shall indicate tag number, valve location by floor and room number, valve size and service controlled.

3.3 CEILING MARKERS

- a. Ceiling markers shall be attached to the ceiling grid as close to indicated equipment as possible.

3.4 NAMEPLATES

- a. Submit listing of all nameplates with associated information to A/E for approval before fabrication.
- b. Mount lamacoid nameplates with chromium plated acornhead screws.

- c. Coordinate method of attachment and location of nameplate with Owner.

End of Section

SECTION 23 2010

HVAC PIPING

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all work in this Section.

b. Furnish and install all refrigerant, natural gas, chilled water, hot water, make up water, and condensate drain piping as shall be required in order to provide a complete and satisfactory system.

c. All pipes used on this project shall be manufactured in the United States and be in compliance with the dimensional and quality standards cited in these specifications.

PART 2: PRODUCTS

2.1 CHILLED WATER, HOT WATER, STEAM AND CONDENSATE:

a. All new pipe used in entire system except where otherwise shown or specified, shall be standard weight Schedule 40 black steel pipe with weights and dimensions in accordance with American Standard Association B36-10 as manufactured by National Tube Company, Birmingham Tank Company, Bethlehem Steel Company or approved equal. Steam and condensate to be carbon steel made to ANSI B 16.9 A106.

2.2 MAKE-UP WATER PIPING:

a. Make-up water piping above grade, shall be Type "L" hard copper tubing with wrought copper sweated fittings. Copper pipe to conform to ASTM Specifications B-88 and fittings to conform to ASA Specifications B-16-22.

b. Joints in copper piping to be reamed, cleaned, fluxed and soldered with 95% tin, 5% antimony solder. Joints between dissimilar metals to be made with red brass fittings.

2.3 DRAIN PIPING:

a. All drain lines shall be run in standard weight galvanized steel pipe or Type "L" hard drawn copper. Drains shall be run in a neat manner to the floor drain and turned down at the floor drain, unless otherwise indicated. Minimum of 1-1/4" unless otherwise shown.

PART 3: EXECUTION

3.1 PIPE AND PIPE FITTINGS:

a. Provide all piping and connections to all items of equipment as shown and/or required to fully complete the system indicated, including drains and other connections. The drawings show the arrangement desired and the Contractor shall follow the drawings as accurately as possible. If conflict should arise, the Contractor shall verify all measurements on the job and cut pipe unless specifically noted for expansion loops. All piping shall be reamed or filed and cleaned to remove burrs and other obstructions.

b. The Contractor shall be responsible for installing all piping work in a neat workmanlike manner. This shall be interpreted to mean that all piping shall be neatly aligned, installed and supported in equally spaced parallel runs using trapeze hangers where applicable, install square, true and plumb with walls, equipment or other related surfaces using standard fittings. Any pipe work installed in a disorderly or unworkmanlike manner as adjudged by the Architect shall be corrected by the Contractor at the Contractor's expense.

3.2 CHILLED WATER, HOT WATER

a. Piping and Pipe Work: Grade all piping properly to insure noiseless circulation of water without formation of pockets. Unless otherwise called for in the plans and specifications, horizontal pipe runs shall be graded to permit complete drainage of the system.

b. All piping 2" diameter or smaller shall be threaded. Piping 2-1/2 inches and larger shall be welded. Joints at valves and equipment in piping 2-1/2 inches and larger shall be flanged. All threads shall be cut with clean and true dies.

c. Install eccentric reducers to change size of mains installed with eccentricity up to keep the top of mains level in the piping.

d. Welding: All welding of joints in piping connections done in the field shall be in accordance with the requirements of the American Standard Code for Pressure Piping.

e. Welding may be either by Metal Arc-Welding Process of the Oxyacetylene Welding Process and in general conformance with procedures established in the latest edition of Appendix B to Section 6 of the ASA Code for Pressure Piping B31.1.

f. Welding fittings shall be used with welded piping. These shall be welding pattern in accordance with ASTM Specifications A-234 and ASA Standard B16.9. Such fittings shall be provided at all changes in direction or changes in pipe size except as hereinafter provided.

g. Weldolet or Thredolet fittings may be used in lieu of welded fittings for branch connection to size 2-1/2" and larger mains, provided branch is two or more pipe sizes smaller than the main.

h. Fittings: Fittings in welded piping shall be standard weight welding fittings, with radii of 1-1/2" the diameter and equal to Tube Turns, Ladish, Taylor Forge or approved equal. See "welding" section for lateral connections and welding fittings standards.

i. Fittings in threaded piping shall be standard weight, malleable iron, screw pattern. Except where otherwise noted, fittings shall be rated for 125 pounds per square inch gauge working pressure and shall be manufactured by Crane, Flagg, Stockham or approved equal.

j. During erection, care shall be taken to remove all dirt, scale and other foreign matter from inside the piping before tying in long sections or installing valves.

3.3 STEAM AND CONDENSATE.

a. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

- b. Install drains, consisting of tee fitting, $\frac{3}{4}$ " ball valve, and short $\frac{3}{4}$ " threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- c. Install steam supply piping at uniform grade of 0.2 percent downward in direction of steam flow. Steam pipe upstream of the PRV bypass valve shall be sloped away from the normally closed PRV bypass valve.
- d. Install condensate return piping at uniform grade of 0.4 percent downward in direction of condensate flow.
- e. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
- f. Unless otherwise indicated, install branch connections to steam mains using 45-degree fittings in main pipe, with takeoff coming out top of main pipe. Use of 90-degree tee fittings is permissible if 45-degree fittings are impractical. If length of branch takeoff is less than 10 feet, pitch branch line down toward mains at 0.4 percent grade.
- g. Install unions in piping 2" and smaller adjacent to each valve, at final connections of each piece of equipment.
- h. Install flanges in piping 2-1/2" and larger at final connections of each piece of equipment.
- i. Install strainers on supply side of each control valve, pressure-reducing valve, solenoid valve, traps, and elsewhere as indicated. Install $\frac{3}{4}$ " nipple and ball valve in blow down connection of strainers 2" and larger. Match size of strainer blow off connection for strainers smaller than 2".
- j. Anchor piping for proper direction of expansion and contraction.
- k. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, control valves, isolation valves, pipe bends, and expansion joints.
 - 1. On straight runs with no natural drainage points, install drip legs at intervals not exceeding 300 feet where pipe is pitched down in direction of steam flow and maximum of 150 feet where pipe is pitched up in direction of steam flow.
 - 2. Size drip legs at vertical risers same size as pipe and extend beyond rise. Size drip legs at other locations same diameter as main. In steam mains 6" and larger, dirt leg size can be reduced, but to no less than 4".
 - 3. Install Ball valve at drip legs, dirt pockets, and strainer blow downs to allow removal of dirt and scale.
 - 4. Install steam traps close to drip legs.
- l. Pitch condensate piping down toward flash tank. If more than one condensate pipe is charges into flash tank, install swing check valve in each line. Install thermostatic air vent at top of tank. Install inverted bucket or float and thermostatic trap at low-pressure condensate outlet, sized for three times condensate load. Install safety valve at tank top. Install pressure gage, ball valve, and swing check valve on low-pressure (flash) steam outlet.

3.3 BLOWING-OUT SYSTEM:

a. All piping and equipment shall be thoroughly blown-out under pressure and clean of all foreign matter wasting condensate through temporary connections so long as necessary to thoroughly clean before system is placed in operation. Use every precaution to prevent pipe compound, scale, dirt, welding and other objectionable matter getting into piping system and equipment.

3.4 HANGERS:

a. All piping shall be supported on not less than 10' centers and within 30" of each change of direction except that piping 1-1/4" size and smaller shall be supported on 6'-0" centers. All hanger spacing shall comply with table 308.5 of the 2009 International Plumbing code

b. All piping shall be hung by means of split type wrought iron hanger rings similar to Grinnell Figure 104 except as otherwise noted. Copper piping not insulated shall be hung from copper plated hangers similar to Figure CT-97. All insulated piping shall be hung by means of clevis type hangers sized to fit outside of insulation, Grinnell Figure 260.

c. Pipe hangers shall be supported by means of iron hanger rods from the building construction or from structural steel members, and in an approved manner. Where required, piping shall be hung from angle iron slips or suitable brackets attached to sides of masonry construction.

d. All insulated piping shall be provided with insulating protection sheet metal saddles. These shall be 20 gauge galvanized iron. Saddles shall be of a length equal to two times the outside diameter of the insulation and shall extend to above the center line of the pipe.

e. Spring type isolators and wood blocking under insulation jacket shall be provided at large piping subject to vibrations as indicated in the plans and details. Contractor shall provide spring isolator submittal indicating construction, spacing, loading and efficiency.

f. Where piping passes through masonry construction, steel pipe sleeves shall be provided, sized to allow at least 1/2" clearance around pipe or insulation where pipe is insulated. Sleeves shall be flush with finished walls and extend 1/2" above finish floors. A watertight seal shall be provided between floor and sleeve and space between pipe and sleeve shall be caulked with lead wool.

3.5 TEST:

a. Pressure test all chilled water, hot water and natural gas piping at a pressure of 150 psig for 24 hours. Architect/Engineer shall be notified 24 hours before test is to be performed.

End of Section

SECTION 23 2131

END SUCTION PUMP

PART 1: GENERAL

1.1 SCOPE:

- a. Furnish and install end suction pumps as required to provide a complete and satisfactory job.
- b. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this section.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC.

- a. Manufacturer's Cuts.
- b. Certified Capacity Ratings.
- c. Installation Instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 END SUCTION PUMPS:

- a. Pumps shall be base-mounted, single stage, end suction design. In cast iron and bronze fitted construction. The pump internals shall be capable of being serviced without disturbing piping connections or motor.
- b. Pump volute shall be made of ductile iron with integrally cast pedestal support. The impeller shall be cast bronze, enclosed type, statically and hydraulically balanced. Impeller shall be keyed to the shaft and secured by a hex head impeller nut and washer.
- c. Pumps shall be provided with a single inside unbalanced mechanical shaft seal for leakless operation. A suitable arrangement shall be provided to furnish a portion of the pumped liquid to lubricate and cool the seal faces.
- d. Pump shall be rated for a minimum of 175 psi working pressure. Casings shall be provided with tapped and plugged holes for priming, vent, and drain.
- e. Pump bearing housing shall have heavy duty regreasable ball bearings.
- f. Baseplate shall be channel steel, sufficiently rigid to support the pump and driving motor.
- g. A flexible-type coupler, capable of absorbing torsional vibration, shall be employed between the pump and motor, and it shall be equipped with a suitable coupling guard as required. Contractor to level and grout each unit according to manufacturer's instructions.
- h. The motor shall be NEMA specifications and shall be the size, voltage and enclosure called for on the plans. Pump and motor shall be factory aligned, and shall be realigned by contractor after installation.

i. Each pump shall be factory tested. It shall then be thoroughly cleaned and painted with at least one coat of high grade machinery enamel prior to shipment.

j. Each pump shall be checked by the contractor and regulated for proper differential pressure, voltage and amperage draw. This data shall be noted on a permanent tag or label and fastened to the pump for owner's reference.

End of Section

SECTION 23 2200

STEAM AND CONDENSATE PIPING ACCESSORIES

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all work in this Section.

1.2 WORK INCLUDED:

- a. Steam traps.
- b. Steam air vents.
- c. Steam pressure reducing stations.

1.3 SUBMITTALS:

- a. Submit shop drawings and product data.
- b. Submit manufacturer's installation instruction.

PART 2: PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS:

- a. Sarco or equal.
- b. Watson McDaniel or equal.
- c. Armstrong or equal.
- d. Manufacturer and model numbers cited are for reference only. It is not the intent of this specification to limit the bidding to the manufacturers cited. Bidders may use products from other manufacturers subject to the prior approval provisions of the specifications.

2.2 THERMOSTATIC STEAM TRAPS:

- a. Balanced pressure, thermostatic type with semi-steel or cast brass body, bolted top, and renewable stainless steel valve hand and seat.
- b. Provide bronze or monel thermostatic element.
- c. Provide to drain condensate from steam radiation units, convectors, and other similar terminal heating units.

2.3 FLOAT AND THERMOSTATIC STEAM TRAPS:

- a. Fully modulating type with semi-steel body and cover, suitable for continuous operation.
- b. Stainless steel float, air vent, head, seat and valve mechanism.
- c. Provide to drain from unit heaters, convertors, heating coils, steam separators, flash tanks, steam jacketed equipment, and direct steam injected equipment.

2.4 BUCKET STEAM TRAPS:

- a. Inverted bucket type with semi-steel body and cover, suitable for intermittent operation.
- b. Stainless steel bucket, seat, head, operating mechanism, and strainer.
- c. Provide to drain condensate from steam main headers and branch lines.

2.5 STEAM TRAP SIZING:

- a. Size to handle a minimum of twice the maximum condensate load of the apparatus served.
- b. Minimum size of traps used to drain steam mains and branches, 3/4".

2.6 STEAM AIR VENTS:

- a. Automatic, thermostatic balanced pressure type, with brass or semi-steel bodies, and renewable stainless steel head and seat.
- b. Phosphor bronze thermostatic bellows, liquid filled.
- c. Provide one or two stages are required to produce flat reduced pressure curve for all ranges of capacity.

PART 3: EXECUTION

3.1 INSTALLATION:

- a. Install items in accordance with manufacturer's instructions.

3.2 STEAM TRAPS:

- a. Install with union or flanged connection at both ends.
- b. Provide gate valve and strainer at inlet, gate valve (and check valve) at discharge.
- c. Provide minimum 10" long dirt pocket of same pipe size as apparatus return connection.
- d. Do not install thermostatic elements in traps until system has been operated and dirt pockets cleared of sediment and scale. Provide temporary covers for use prior to this time.

3.3 STEAM PRESSURE REDUCING STATIONS:

- a. Connect pilot operator control line downstream far enough to sense true pressure.
- b. Rate relief valves for the station upstream steam pressure. Size for full installed capacity of reducing station. Set valve to relieve at not more than 20% above reduced pressure.

3.4 RELIEF VALVE:

- a. Terminate vent lines from relief valves outdoors. Provide drip pan elbow with draining connection to nearest floor drain.
- b. Where several relief valves vents connect to one vent header, size header cross sectional area to equal the sum of individual vent outlet areas.

End of Section

SECTION 23 2500

HVAC WATER TREATMENT

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

b. Furnish and install water treatment including equipment required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 GENERAL:

a. The Contractor will furnish, install and provide all equipment, chemicals and the necessary service for a Water Treatment Program. A single water treatment company shall be responsible for all products and services and be a recognized specialist in the field of industrial water treatment for a minimum of ten years. The water treatment company shall have regional water analysis laboratories, research and development facilities, plus technical service representatives located within the trading area of the job site.

b. The water treatment products and service shall be provided by the Mogul Corporation, IMCOR, or Garratt Callahan Comp or approved equals.

2.2 PRE-OPERATIONAL SYSTEM CLEAN-OUT:

a. All condenser and hot water lines and related equipment shall be thoroughly flushed out with pre-cleaning chemicals designed to remove deposition such as pipe dope, oils, loose rust and mill scale and other extraneous materials. Add recommended dosages of pre-cleaner chemical products and circulate throughout the water system. Drain, fill and flush water system until no foreign matter is observed and total alkalinity of the rinse water is equal to that of the makeup water.

2.3 CHEMICAL FEEDING AND CONTROL EQUIPMENT - CONDENSER SYSTEM:

a. Contractor shall install one (1) packaged controller for controlling conductivity and chemical treatment in cooling water systems (including all external piping and wiring). The controller shall have the following features and capabilities:

- 1. Conductivity Monitor: Will provide linear, temperature compensated measurements

directly in micromhos over full scale. There will be two ranges of measurement provided, 50-1,000 micromhos and 500-10,000 micromhos, which shall be field selectable. Conductivity measurement will be displayed on a 2 inch indicating meter with 0-10 scale. Power switch, set point adjustment, test button, calibration screw, indicating lights and indicating meter shall all be front panel mounted for each access. The controller shall be insensitive to phase angle shifts and be capable of operating with input line voltage of 95 to 130 volts AC, without affecting accuracy.

2. Inhibitor Feed: Inhibitor chemical will be fed proportional to makeup water. A water meter with electric contactor shall pulse a solid state reset counter with an adjustable range of 0-99 counts. Completion of the counter cycle will initiate solid state reset timer for activating the inhibitor pumps and adjustable range of 0-10 minutes.

3. Biocide Feed: Biocide chemical feed will be controlled by a 14 day, 24 hour timer which will actuate a chemical pump whenever required up to a 14 day repeating cycle.

b. The conductivity monitor, chemical pumps and sample stream piping assembly shall be mounted on a wall frame structure. This structure shall be mounted on a wall frame structure. This structure shall be fabricated from 14 gauge, cold rolled steel, primed and painted with polyurethane enamel paint for corrosion protection. All components of the controller system on the wall frame structure shall be pre-plumbed and pre-wired to form an operational and ready to install system. The controller system shall consist of the following:

1. One (1) sample stream piping assembly consisting of:
 - (a) Two (2) 3/4" inlet/outlet shut-off valves rated for 125 psi service.
 - (b) One (1) flow switch rated for 125 psi service.
 - (c) Two (2) 3/4" PVC chemical injection tees.
 - (d) One (1) conductivity probe of PVC construction with a temperature compensating element mounted in a quick disconnect fitting.
2. One (1) - pre-piped bleed-off piping assembly consisting of inlet shut-off valve, wye strainer flush valve, throttling valve and O_PSI differential brass solenoid valve. Bleed-off piping assembly shall be sized to bleed twice the maximum design bleed-off rate of the system.
3. Two (2) - chemical feed pumps, positive displacement type with ball-type check valves, shall be provided for feed of the corrosion inhibitor and biocide. Feed rate shall be adjustable while pump is running and necessary polyethylene tubing included.
4. One (1) - corporate stop and injection assembly with PVC diffuser tube and back check valve for injecting chemicals into the recirculating line.
5. One (1) - water meter complete with electric contacting register sized to meter twice the volume of the maximum makeup water rate of the system.

2.4 CHEMICAL FEEDING AND CONTROL EQUIPMENT – HOT WATER SYSTEMS:

a. For each hot system, contractor shall install a one-shot feeder with funnel, and air release valve. The one-shot feeder shall have a minimum capacity of the five gallons and be designed to meet the pressure requirements of the system.

2.5 WATER TREATMENT CHEMICALS - HOT WATER SYSTEM:

a. Furnish one year's supply of the recommended formula for scale and corrosion protection of close recirculating system. Formulation shall not contain any ingredients which are harmful to system materials of construction.

2.6 TESTING EQUIPMENT:

a. Furnish Mogul basic water test equipment, spare re-agents for maintaining control of program standards in the condenser, hot water system. Test kits will include the following:

1. Re-agents and apparatus for determination of corrosion inhibitor level in the water system.
2. Re-agents and apparatus for determination of pH, P & M, alkalinity and chlorides.
3. One (1) test cabinet suitable for wall mounting for storage of testing glassware and re-agents. The cabinet will have one shelf, key-lock door and fluorescent light. Cabinet shall be constructed of 18 gauge, cold rolled steel, primed and painted with white, polyurethane enamel paint for corrosion protection.

PART 3: EXECUTION

3.1 WATER TREATMENT SERVICE PROGRAM:

a. The chemical supplier shall provide all consulting services for a period of one year from start-up of the cooling system which will include:

1. Installation and system start-up procedure recommendations.
 2. Pre-operation system clean-out procedure supervision.
 3. Initial water analysis and recommendations.
 4. Training of operating personnel on proper feeding and control techniques.
 5. Periodic field service and consultation meetings.
 6. Any necessary log sheets and record forms.
 7. Any required laboratory and technical assistance.
- b. All services will be provided by a qualified, full-time representative of the chemical supplier.

End of Section

SECTION 23 3000HVAC AIR DISTRIBUTIONPART 1: GENERAL

1.1 SCOPE:

a. Furnish and install all sheet metal work shown or called for including ductwork and connections to fans and equipment.

b. Ductwork shall be provided and installed as shown on the drawings. All details of ductwork are not indicated, and necessary bends, offsets and transformation must be furnished whether shown or not.

c. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.

1.3 RELATED DOCUMENTS:

- a. Section 23 0700 – HVAC Insulation.

PART 2: PRODUCTS

2.1 GENERAL:

a. All ductwork, plenums and casings shall be constructed of sheet metal, as herein specified. All sheet metal construction shall conform to the pressure classification shown on the contract drawings, or herein specified and shall be in accordance with the construction and installation details in Chapter 1 of the 1983 ASHRAE Handbook or the appropriate SMACNA Standards.

2.2 LOW PRESSURE DUCTWORK:

a. Low pressure ductwork shall be constructed of zinc coated sheet steel and shall conform to the 1st Edition of SMACNA HVAC Duct Construction Standards, as follows:

1. Rectangular Duct:
 - (a) 1" w.g. pressure class - Table 1-4 ex.
 - (b) 2" w.g. pressure class - Table 1-5 ex.

Unless otherwise noted, all low pressure rectangular ductwork shall be constructed according to the 1" w.g. pressure class.

2. Round Duct:

- (a) 2" w.g. pressure class - Table 3-2.

2.2 GENERAL EXHAUST DUCTWORK:

a. Unless otherwise noted, all exhaust ductwork shall be constructed the same as specified for low pressure ductwork.

2.3 FLEXIBLE DUCTWORK:

a. Flexible air duct for connections between medium pressure duct and terminals units and between low pressure duct to diffusers shall be equal to Thermaflex M-KE. Duct shall be listed by Underwriter's Laboratories under UL 181 standards as Class 1 flexible air duct material and shall comply with NFPA Standards 90A and 90B. Duct shall be rated to operate at pressures up to 6" w.g. for sizes 10" and 4" w.g. for sizes 12" and above. Maximum length of flexible air duct shall be 6 feet.

b. Duct shall be a factory fabricated assembly composed of a polymeric liner duct bonded permanently to a coated spring steel wire helix and supporting a fiberglass insulating blanket. Outer vapor barrier shall be of fiberglass reinforced film laminate. Connections shall be made with Thermaflex, or equal, duct straps.

2.4 FIRE DAMPERS:

a. Furnish and install, at locations shown on plans, or where required by code, fire dampers constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have either a 1-1/2 hour or 3 hour fire protection rating (based on wall or floor rating) 212 degrees F. fusible line, and shall include a UL label in accordance with established UL labeling procedures. Damper manufacturer's literature submitted for approval prior to installation shall include comprehensive performance data developed from testing in accordance with AMCA Standard 500 and shall illustrate pressure drops for all sizes of dampers required at all anticipated airflow rates. Fire dampers shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing steel sleeves, angles, other materials and practices required to provide an installation equivalent to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. Fire dampers shall be style "A", "B" or "C" as required.

2.5 ACCESS DOORS:

a. Ventifabrics, Krueger or Duro-Dyne, (Min. 12" x 10" - use 16" x 12" where size permits) insulated doors shall be provided for fire dampers, and other locations where shown. Door shall be minimum 24 gauge galvanized, double construction with 1" insulation complete collar mounting frame, steel butt hinges, felt gaskets, fasteners and handles. Access doors shall be labeled per requirements of the International Mechanical code (2000) paragraph 607.4

2.6 INSTRUMENT TEST HOLES:

- a. Ventlock No. 699 with gasket. Provide a minimum of one in each zone supply duct.

2.7 TURNING VANES:

a. Turning vanes and Deflector Controls, Barber-Colman, Carnes Corporation, Kruger or Titus in HVAC Air Distribution

length up to 18"; Aero-Dyne Duro-Dyne, or Airsan double thickness about 24" in length, installed in rails.

2.18 FLEXIBLE CONNECTIONS:

a. Flexible duct connections shall be provided where ductwork connects to equipment; ventifabrics or Duro-Dyne 28 ounce minimum waterproof and fire retardant woven glass fabric double coated with neoprene, approved by UL. Maximum length of flexible connections shall be 10 inches.

2.9 MANUAL AND MOTOR OPERATED DAMPERS:

a. American Warming and Ventilating Company Type DAA-P-50, opposed blade, constructed with 15 gauge steel blades. Manual dampers shall be provided with Ventlock No. 637 hand operated locking quadrants located outside of ducts. Locking quadrants shall be elevated 1-1/2" for insulation. Manual dampers 18" x 10" or smaller may be single blade type construction of 16 gauge galvanized sheet metal. Dampers of Ruskin, Krueger, Louvers and Dampers, or Advanced Air, Inc. will be acceptable.

2.10 SPLITTER DAMPERS:

a. Install where shown and at duct splits; provide with Ventlock No. 690 self-locking device; constructed of 16 gauge galvanized steel with hemmed leading edge and reinforced at hinged side.

2.11 GRILLES, REGISTERS AND DIFFUSERS:

a. Grilles, registers and diffusers shall be of the type, size and design as shown on the drawings and/or as specified below. Grilles within the same room or areas shall be of the same type and style to provide architectural uniformity.

b. Each supply, return and exhaust device shall be of the proper design as indicated to handle quantities of air within the space with maximum diffusion and without objectionable air movement or noise level.

c. Each supply outlet and resister shall have a volume damper control operable from the front of the device with removable key. Where indicated on the drawings, all side wall registers shall be equipped with deflectors.

PART 3: EXECUTION

3.1 DUCTWORK:

a. All ductwork shall be provided in a neat workmanlike manner. The ducts shall be properly braced and reinforced. All slip joints shall be made in the direction of flow. All ducts shall be true to the dimension indicated and shall be straight and smooth on the inside with neatly finished airtight joints. The ducts shall be securely anchored into the building construction in an approved manner and shall be completely free from vibration under all conditions of operation. All supply, return fresh-air and exhaust systems shall be completely balanced.

b. No duct transformation shall be of a ratio less than four to one and where possible, shall be of a ratio of six to one. No less than three vertical splitters shall be provided where these ratios cannot be met. No elbow shall have a throat center line radius of less than one and one-half times the duct width at

the turn. All turns of less than this amount in rectangular duct shall be provided with duct turning vanes of standard design. Splitters or multi-blade volume dampers, where indicated, shall be provided in all branch.

c. Turning vanes shall be provided at all tees and square elbows. Turning vanes shall be factory fabricated and designed in accordance with the SMACNA or ASHRAE Guide for formed vanes. The first set of turning vanes on the leaving side of fans shall be of the acoustical type to aid in the elimination of unit noise with the exception of room fan coil units.

d. Splitter dampers and volume extractors shall be provided in all low velocity ductwork for proper air distribution. Each damper shall be provided, lubricated bearings at both ends of the shafts, adjustments quadrant, and locking devices and shall be constructed of galvanized iron or steel sheet one gauge heavier than the duct in which they are installed. Access doors shall be located at all splitter dampers.

e. Handholes of not less than 6" x 6" shall be provided at all points where access is required. Manholes of not less than 18" x 24" shall be provided at all points where it is necessary to clean or remove parts of equipment. All access doors and handholes shall be rubber gasketed insulated type with frame and latches.

f. Install access doors at each fire damper, and smoke detector.

g. All joints and seams in ductwork exposed to weather shall be sealed watertight with a suitable non-aging sealer.

3.2 DUCT HANGERS AND SUPPORTS:

a. Duct hangers and supports shall conform to those shown in Tables 4-1 and 4-2 of SMACNA HVAC Ductwork.

3.3 WALL PENETRATIONS:

a. Where ducts pass through non-rated walls and is exposed to view the duct shall be furnished with suitable metal collar.

b. Where ducts pass through one hour fire walls, provide not less than 1/2" clearance between the duct and combustible material. Seal the clearance space with non-combustible material retained, and the duct secured in place by steel collars of a gauge equivalent to that of the duct and fastened to both the duct and the enclosure.

c. Where fire dampers are shown or required, dampers shall be installed per manufacturer's UL listing.

3.4 CLEANING DUCT SYSTEMS:

a. Before fan systems are put in operation, vacuum clean inside of air units, plenums and apparatus housing. Filters are to be installed before moving air through duct systems.

End of Section

SECTION 23 3416

EXHAUST FANS

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

b. Furnish and install roof mounted exhaust fans as required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 IN-LINE FANS - DIRECT DRIVE:

a. Supply or exhaust fans shall be direct driven in-line type. The square fan housing shall be four sides of heavy gauge galvanized steel. One of the sides shall be hinged and shall support the motor and wheel assembly allowing the assembly to swing out for cleaning, inspection, or service without dismantling the unit in any way. The motor shall be isolated from the air stream by a motor enclosure and shall draw cooling air from outside the fan housing.

b. The fan inlet shall be spun venturi throat overlapped by a backward curved centrifugal wheel with spun cone for maximum performance.

2.2 IN-LINE FANS - BELT DRIVE:

a. Supply or exhaust fans shall be belt driven in-line type. The square shaped fan housing shall be of heavy gauge galvanized steel. One of the sides shall be hinged and shall support the entire drive assembly and wheel allowing the assembly to swing out for cleaning, inspection, or service without dismantling the unit in any way. The motor shall be mounted on the hinged side exterior isolated from the airstream. The belt and pillow block ball bearings shall be protected from the airstream by an enclosure. The shaft shall be keyed to both the wheel and pulley.

b. The fan inlet shall be a spun venturi throat overlapped by a backward curved centrifugal wheel with spun cone for maximum performance.

- c. Air and sound shall be AMCA licensed.

End of Section

SECTION 23 3600

Fan Coil Units

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.
- b. Furnish and install terminal units as required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Manufacturer's Cuts.
- b. Certified Capacity Ratings.
- c. Installation Instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 FAN COIL UNITS:

Provide Enviro-Tec Fan Coil Units or approved equal of the type, arrangement, size, and indicated capacities and characteristics. Units shall be completely factory assembled, tested and shipped as one piece. All units shall be capable of meeting or exceeding the scheduled capacities for cooling, heating and air delivery. All unit dimensions for each model and size shall be considered maximums. Units shall be ETL listed in compliance with UL/ANSI Standard 1995, and be certified as complying with the latest edition of ARI Standard 440.

2.2 Construction:

All unit chassis shall be fabricated of heavy gauge galvanized steel panels able to meet 125 hour salt spray test per ASTM B-117. Casing shall be internally lined with Elastomeric Closed Cell Foam Insulation. Insulation shall conform to UL 181 for erosion and NFPA 90A for fire, smoke and melting, and comply with a 25/50 Flame Spread and Smoke Developed Index per ASTM E-84 or UL 723. Additionally, insulation shall comply with Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21. Polyethylene insulation is not acceptable.

All concealed units shall have a minimum 1-1/2" duct collar on the discharge. Plenum and exposed units shall have a minimum 3/4" duct collar on the return.

All exposed units shall have exterior panels fabricated of galvanealed steel. The fan and filter bottom access panel shall be attached with quarter turn quick open fasteners to allow for easy removal and access for service.

Unit mounting shall be by hanger brackets provided at four locations. Hanger brackets shall include rubber grommet isolators with brass eyelets for threaded rod.

2.3 Painted Finish:

All painted cabinet exterior panels shall be finished with a heat cured anodic acrylic powder paint of the standard factory color. If fan coil is concealed in ceiling plenum, then finish is only required on ceiling access panel. Color shall be Enviro-Tec Pearl White.

2.4 Sound:

Units shall have published sound power level data tested in accordance with ARI Standard 350-2000 (non-ducted equipment) and ARI Standard 260-2001 (ducted equipment).

2.5 Fan Assembly:

Unit fan shall be a dynamically balanced, forwardly curved, DWDI centrifugal type constructed of 18 gauge zinc coated galvanized steel for corrosion resistance. Motors shall be high efficiency, permanently lubricated sleeve bearing, permanent split-capacitor type with UL and CSA listed automatic reset thermal overload protection and three separate horsepower taps. Single speed motors are not acceptable.

The fan assembly shall be easily removable for servicing the motor and blower at, or away from the unit. The entire fan assembly shall be able to come out of the unit by removing two screws and unplugging the motor. Plenum unit fan assemblies shall be easily serviced through an access panel provided.

Devices used to energize and de-energize (switch) fan speeds must be totally silent. Magnetic, mercury, and/or quiet relays and/or contactors are not acceptable.

2.6 Coils:

All cooling and heating coils shall optimize rows and fins per inch to meet the specified capacity. Coils shall have seamless copper tubes and shall be mechanically expanded to provide an efficient, permanent bond between the tube and fin. Copper tube wall shall be 0.025. Fins shall have high efficiency aluminum surface optimized for heat transfer, air pressure drop and carryover.

All coils shall be hydrostatically tested at 450 PSIG air pressure under water, and rated for a maximum of 300 PSIG working pressure at 200°F.

Cooling Coil casing shall be fabricated from 304 Stainless Steel.

All coils shall be provided with a manual air vent fitting to allow for coil venting.

Cooling and heating coils shall be in separate coil casings and have a minimum 2" gap between them and 1-1/2" of clearance on the entering and leaving air sides to allow access from bottom of unit for cleaning when the drain pan is removed. Common tube sheets and coil casing are not acceptable. Water coils on concealed models shall be field reversible for right, left or opposite side connections.

Heating coils shall be furnished in the reheat position.

2.7 Drain Pans:

Provide a single wall primary drain pan constructed entirely of heavy gauge stainless steel for superior

corrosion resistance. Drain pans shall be of one-piece construction and be positively sloped for condensate removal. Drain pans on concealed models shall be field reversible for right or left hand connections.

The drain pan shall be externally insulated with a fire retardant, closed cell foam insulation. The insulation shall carry no more than a 25/50 Flame Spread and Smoke Developed Rating per ASTM E-84 and UL 723 and an Antimicrobial Performance Rating of 0, no observed growth, per ASTM G-21.

Drain pan shall be provided with factory mounted overflow switch

Provide an auxiliary drip tray under valve package per detail on plans. Auxiliary drip pan shall be constructed of stainless steel.

2.8 Filters:

All plenum and exposed units shall be furnished with a minimum 1" pleated filter (MERV 8). Filters shall be tight fitting to prevent air bypass. Plenum unit filters shall be easily removable from the bottom of the unit without the need for tools.

2.9 Bottom Sheetrock Return Air Access Panel w/ Telescoping Duct:

Provide optional telescoping bottom panel with integral return to allow for full service of fan coil and associated piping packages for all ceiling concealed fan coils. Panel shall be factory painted. The telescoping duct connection shall allow for 2" adjustment and include rack mounted filter.

2.10 Electrical:

Units shall be furnished with single point power connection. Provide an electrical junction box with terminal strip for motor and other electrical terminations. The factory mounted terminal wiring strip shall be an integral part of the ETI BC-06 Control board with integral control transformer and 3-speed relays. Provide toggle disconnect switch.

Provide a hinged electrical enclosure in the bottom of the unit for easy access to all electrical components, terminal blocks, BC06 control board and wiring. DDC Controller shall also be factory installed in this enclosure.

2.11 Piping Packages:

Provide factory piping package components for all fan coil units. Piping packages shall consist of following:

Chilled Water Supply: strainer with blowdown valve, P/T's, shutoff valve, union connection
 Chilled Water Return: union connection, PIC control valve (provided by JCI), P/T's, shutoff valve
 Hot Water Supply: strainer with blowdown valve, P/T's, shutoff valve, union connection
 Hot Water Return: union connection, control valve (provided by JCI), flow control/shutoff valve, P/T's

Components shall be provided to contractor for field installation. Components shall be installed so that the chilled water packages sit over auxiliary drip pan.

2.12 Controls Package:

FCU Manufacturer to provide, install and wire any and all controls required to accomplish the FCU

sequence of operation specified per the following table:

Control Device	Supplied By	Installed By	Wired By
DDC Controller	Controls Contractor	FCU Manufacturer	FCU Manufacturer
Space Sensor	Controls Contractor	Controls Contractor	Controls Contractor
FCU Speed Switch	Controls Contractor	Controls Contractor	Controls Contractor
Control Valves	Controls Contractor	Mechanical Contractor	Controls Contractor
Discharge Air Sensor	Controls Contractor	Controls Contractor	Controls Contractor
Control Transformer	FCU Manufacturer	FCU Manufacturer	FCU Manufacturer
Fan Speed Relay Control	FCU Manufacturer	FCU Manufacturer	FCU Manufacturer
Drain Pan Float Switch	FCU Manufacturer	FCU Manufacturer	FCU Manufacturer
Controller Enclosure	FCU Manufacturer	FCU Manufacturer	Not Applicable

Notes:

- 1) Installation shall include mounting, wiring and terminations.
- 2) FCU shall be made completely ready for field termination of space sensor, speed switch and control valves and discharge air sensor
- 3) Control devices specified to be provided by controls contractor but installed by manufacturer shall shipped direct to manufacturer for factory installation
- 4) FCU controller shall be field programmed by controls contractor.
- 5) Manufacturer to wire DDC controller per wiring diagram provided by controls contractor.

End of Section

SECTION 23 5700

HEAT EXCHANGERS FOR HVAC

PART 1: GENERAL

1.1 SCOPE:

- a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.
- b. Furnish and install heat exchangers required to provide a complete and satisfactory job.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Catalog cuts.
- b. Certified capacity ratings.
- c. Installation instructions.
- d. Operating and Maintenance Instructions.

PART 2: PRODUCTS

2.1 HEAT EXCHANGER:

- a. Furnish and install, as shown on the plans, one factory assembled heat exchanger. Unit shall be mechanically cleanable on both shell side and tube side. Fluid flow paths shall be completely counterflow. Heat exchanger and condensate return unit are to be provided as a rack mounted factory assembled unit requiring only filed connection to the assembled unit of steam condensate and chilled water piping by contractor.
- b. The shell shall be constructed of carbon steel pipe. Connections shall be carbon steel pipe with 150 lb. ASA flanges for ease of installation.
- c. The shell and tube bundle shall each be tested at 190 psig air under water.
- d. Tubes shall be corrosion resistant copper, with enhanced surface designed, formed and tested by the heat exchanger manufacturer. Baffles shall be glass-filled polypropylene and shall support the tubes. They shall be oriented so as to direct the shell-side fluid over the tubes in a spiral flow pattern. Tubes shall be individually replaceable without the need for rolling, welding or brazing.
- e. Water boxes shall be marine type. At least one end must be easily removable without disturbing the system piping to allow access for tube inspection and/or cleaning. All connections shall be carbon steel pipe with 150 lb. ASA flanges for ease of installation.
- f. A compression seal shall be provided between the tubes and tube sheet to allow access to both shell and tubes for ease of maintenance. Over tightening of seal bolts shall not damage the structural integrity of the heat exchanger. Seal shall provide for zero leakage.
- g. Furnish with the unit an extra set of gaskets and bullet inserts for changing the gasket.

End of Section

SECTION 23 7300

OUTDOOR AIR UNITS

PART 1: GENERAL

1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all work in this Section.

b. Furnish and install packaged Outside Air units at shown or required to provide a complete and satisfactory job.

1.2 RELATED WORK:

- a. Section 23 2010 – HVAC Piping
- b. Section 23 0700 – HVAC Insulation
- c. Section 23 3000 – HVAC Air Distribution

1.3 REFERENCES:

- a. ARI 430 - Standard for Central Station Air Handling Units.
- b. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
- c. ANSI/AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- d. SMACNA - HVAC Duct Construction Standards.
- e. ARI 410 - Standard for Forced Circulation Air-Cooling and Air-Heating Coils.
- f. ANSI/UL 900 - Test Performance of Air Filter Units.
- g. AMCA 301 - Method for Publishing Sound Ratings for Air Moving Devices.

1.4 QUALITY ASSURANCE:

a. Outside Air Units: Product of manufacturer regularly engaged in production of components who issues complete catalog data on total product offering.

b. Outside Air Units: Certify capacity, static pressure, fan speed, brake horsepower and selection procedures in accordance with ARI 430-89.

c. Air Coils: Certify capacities, pressure drops and selection procedures in accordance with ARI 410-87.

1.5 SUBMITTALS:

a. Submit as-built drawings and product data under provisions of Section 23 0500 – Common Work Results for HVAC.

- b. As-built drawings shall show unit configuration in direction of airflow, and shall indicate assembly and unit dimensions.
- c. Product data shall indicate dimensions, weights, capacities, fan performance, motor electrical characteristics, and finishes of materials.
- d. Submit product data of filter sizes and quantities, filter performance, and filter frames.
- e. Submit manufacturer's installation instructions under provisions of Section 23 0500 – Common Work Results for HVAC.
- f. Provide fan curves with specified operating point clearly plotted.
- g. Submit sound power levels for air handling unit(s) at scheduled conditions. If unit exceeds sound power levels at scheduled conditions, manufacturer must provide sound attenuators.

1.6 OPERATION AND MAINTENANCE DATA:

- a. Submit operation and maintenance data under provisions of Section 23 0500 – Common Work Results for HVAC.
- b. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.7 DELIVERY, STORAGE, AND HANDLING:

- a. Deliver products to site under provisions of Section 23 0500 – Common Work Results for HVAC on a factory-installed 6" high base rail or shipping skid.
- b. Store and protect products under provisions of Section 23 0500 – Common Work Results for HVAC.
- c. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.8 ENVIRONMENTAL REQUIREMENTS:

- a. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.9 EXTRA STOCK:

- a. Provide one extra set of renewable media filters.

PART 2: PRODUCTS

2.1 The energy recovery systems shall be COMPLEVENT Model CDS units as manufactured by Munters or equals by trane, carrier or other approved equals. The units shall be dedicated horizontal airflow. The operating range shall be between -20°F and 115°F as standard for all units. Heat exchanger performance shall be rated in accordance with ARI 1060. All units shall be factory assembled, internally

wired and 100% run to check operation, fan rotation and control sequence before leaving the factory. Units shall be ETL listed and labeled, classified in accordance with UL 1995/CAN/CSA/ No. 236-M90.

2.2 The floor and base shall be constructed of formed 16 gauge galvanized steel with integral drain piped to a 3/4" FPT side connection. The unit floor shall be insulated with minimum 1" sprayed closed-cell polyurethane insulation underneath. Insulation shall cover entire floor of unit to prevent condensation and shall have a minimum insulating value of R-8. Lugs for lifting the unit shall be an integral part of the structure.

2.3 Unit casing shall consist of 18 gauge galvanized steel outer steel walls and roof insulated with 1" thick, 1.5 pound per cubic foot insulation, protected on the inside by a 22 gauge galvanized steel inner liner. Double-wall removable access panels shall be provided for inspection/maintenance of all components. Doors shall be hinged in fan and filter sections.

2.4 Filters shall be 2" deep pleated type as standard in the outdoor and return air streams, providing an average efficiency of 30% by ASHRAE standard 52-76 test method.

2.5 Fans shall be class I or II forward curved centrifugal type. The fan wheel shall be statically and dynamically balanced before installation. Motors shall be high efficiency, open drip proof (ODP) type with 1.15 service factor, with UL listing. Efficiencies shall be equal to or greater than those specified in the Energy Policy Act of 1992 (EPACT). Motor shall be mounted on an adjustable base. The motor, drive, and fan assemblies shall be isolated from the unit casing using spring isolation.

2.6 Opposed blade outside and exhaust air dampers with electric two-position operators shall be provided. Actuators shall be spring return type to automatically close dampers upon a power failure. Dampers shall be low-leak type with blade and side seals.

2.7 An integral electrical control panel shall be provided. All power wiring shall be brought to a common terminal strip and only a single point electrical connection shall be required. All components shall be fully wired and tested prior to shipment and all major electrical components shall be UL listed. Electrical system shall be ETL listed and labeled, in accordance with UL 1995. A unit mounted disconnect switch shall be provided.

2.8 A chilled water cooling coil shall be sized to provide moisture removal of the capacity indicated on the equipment schedule. Coil shall be of 1/2-inch O.D. copper tubes mechanically bonded to configured aluminum plate fins. Coils shall be leak tested at the factory to insure pressure integrity. The coils shall be rated at 450 PSIG. Coil shall be rated in accordance with ARI standards.

2.9 A hydronic heating coil shall be furnished. It shall be mounted either in the reheat position. Heating coil shall be 1/2-inch O.D. copper tubes mechanically bonded to configured aluminum plate fins. Coils shall be leak tested at the factory to insure pressure integrity. The coils shall be rated at 150 PSIG.

2.10 The precool heat exchanger shall be of the rotary total energy type, with efficiency and pressure drop as scheduled. Rotor shall be constructed of corrugated aluminum media providing individual flutes to channel the airflow and thus minimize cross contamination and ensure rated performance under all differential pressure conditions. Ribbon-type or plastic heat exchangers that cannot control cross contamination are not acceptable.

2.11 The reheat heat pipe type heat exchanger shall be constructed of one-piece extruded aluminum tubes installed within a 16-gauge galvanized steel casing providing both structural integrity as well as an airtight seal. Two component heat pipes such as expanded tube-to-fin shall not be acceptable in order to

prevent efficiency degradation resulting from the eventual weakening of the fin-to-tube bond with age. Individual heat pipes shall be furnished within the casing and will accommodate expansion unique to each tube without damage to the integrity of the entire heat exchanger. Plate fin coil-type heat exchangers shall not be acceptable because of the shortened life caused by non-floating heat exchanger tubes. The heat pipes shall be individually charged, 1-inch I.D. with 0.063-inch wall thickness. Fins shall be of 0.015 mean thickness, tapered root to fin tip. Fin surface from root to fin tip shall have aluminum of 0.437 inch mean thickness, tapered root to fin tip. Fin density shall be 11 fins per inch. Heat pipes shall be a maximum of 2-1/8 inch on center in the face, and shall be 1-7/8 inch on center row-to-row. Heat pipes shall be individually processed, weld-sealed, charged, and factory tested. Each pipe is constructed with an automotive type valve which provides the opportunity to take advantage of future refrigerant developments. Heat transfer fluid shall be Class I in the American National Safety Code for mechanical refrigeration. Heat exchanger performance shall be rated in accordance with ASHRAE Standard 84-1991 and ARI Standard 1060

2.12 An electronic programmable microprocessor-based logic controller (PLC) with key pad input and LCD display shall be furnished to control the energy recovery system. Temperature and humidity set points and 365-day clock functions including daylight savings, holiday programming and user overrides, shall be easily input by the operator. All required outside air and supply air temperature sensors and humidity transducers shall be provided as specified. Space humidity transducer and temperature sensor shall be field mounted and wired by the controls contractor if required. Refrigeration shall be staged by the microprocessor PLC.

PART 3: EXECUTION:

3.1 INSTALLATION:

a. Outside Air units are to be installed according to the per manufacturer's installation instructions. Unit start up shall be per manufacturer's instructions and shall be conducted by a factory trained technician.

End of Section

SECTION 25 5000INTEGRATED AUTOMATIC FACILITY CONTROLSPART 1 – GENERAL1.1 Related Documents

- a. All work of this Division shall be coordinated and provided by the single Central Control and Monitoring System (CCMS) Contractor.
- b. The work of this Division shall be scheduled, coordinated, and interfaced with the associated work of other trades. Reference the Division 23 Sections for details.
- c. The work of this Division shall be as required by the Specifications, Point Schedules and Drawings.

1.2 Scope

- a. This section includes the controls, instrumentation and associated piping and wiring required to make the mechanical systems provided under Division 23 perform as described in these specifications and as shown. Provide a complete system of automatic temperature control of the direct digital type. The system shall be complete in all respects including all labor, materials, equipment, and service necessary, and shall be installed by personnel in the direct employ of the manufacturer. Provide a distributed process network control system complete with all necessary hardware and software including all programming. The DDC systems for Maxcy Dorm shall be compatible with the existing USC campus wide control system network in all respects. The existing control system network is Johnson Controls Mitosis.
- b. Provide a complete and operational Central Control and Monitoring System (CCMS) including all devices and software necessary to perform the functions herein described or indicated on the drawings.
- c. The CMMS shall be a Web based system communicating over the building owners Local Area Network (LAN). Contractor shall be responsible for coordination with the owner's IT staff to ensure that the CMMS will perform in the owner's environment without disruption to any of the other activities taking place on that LAN. TCP/IP connections and addresses shall be provided by the owner for connection of supervisory panels to the USC network..
- d. The primary desktop and laptop interface will be via a standard Web Browser such as Internet Explorer or Netscape. CMMS contractor shall provide software license(s) for CMMS access for a minimum of twenty concurrent users.
- e. Utilize the existing CMMS server for the purpose of providing a location for archiving system configuration data, graphics and historical data such as trend data and operator transactions.
- f. The primary focus of the Central Control and Monitoring System (CCMS) will be to monitor and control the new HVAC system components, air handling units, fans, heat exchangers, coils, valves, pumps, variable speed drives, trending, graphic functions, etc. The system shall be expandable to serve future equipment, systems, and auxiliary field devices.
- g. CCMS contractor shall provide all DDC panels, power supplies, wiring, conduit, solenoid valves, relays, differential pressure transmitters, differential pressure switches, RTDS, pressure sensors, etc. necessary for a complete and operable automatic control system and DDC field panels and connecting LAN.

- h. The systems engineering phase shall include the selection and integration of components into a complete system which will meet the performance and prescriptive requirements of the Contract, together with drawings, specifications, descriptions of operation, diagrams including system architecture and other materials listed under "Submittals" paragraph of this Section. The successful contractor shall be responsible for all systems engineering.

1.3 Quality Assurance

- a. Quality assurance for automatic control systems includes a multi-step program consisting of a pre-qualification procedure for manufacturer and installation specialist; a system engineering, products and shop drawing phase; installation; testing and adjusting; reporting; commissioning testing and verifications; operating instruction and training; and the submission of maintenance and operating manuals.
- b. CMMS Contractor
 - i. The Central Control and Monitoring System (CMMS) herein specified shall be fully integrated and installed as a complete package by the Central Control and Monitoring System contractor. The System shall include all wiring, piping, installation supervision, calibration, adjustments, and checkout necessary for a complete and fully operational system.
 - ii. The CMMS Contractor shall be a factory owned branch office that is regularly engaged in the engineering, programming, installation and service of CMMSs of similar size and complexity. Bids by wholesalers, mechanical contractors, franchised dealers, applied partners or any other firm whose principal business is not that of manufacturing and installing automatic temperature control systems shall not be acceptable.
 - iii. The CMMS Contractor shall have a minimum of ten years experience with the complete, turnkey installation of CMMSs of similar size and technical complexity.
 - iv. The CMMS shall be complete in all respects and shall be provided, installed and commissioned by the CMMS equipment manufacturer. Equipment manufacturer shall be responsible for and warrant the proper installation and operation of the CMMS and control system equipment.
 - v. Johnson Controls, Inc or approved equals to provide and install the CMMS for this project subject to their ability to meet all requirements of this specification:
 - vi. Bid approval does not imply nor suggest compliance of specification requirements.
- b. CMMS Products Manufacturer:
 - i. The CMMS architecture shall consist of the products of a manufacturer regularly engaged in the production of CMMSs, and shall be the manufacturer's latest standard of design. Controllers and DDC (Direct Digital Control) system components shall be current production products.
 - ii. All other equipment shall be the products of the CMMS manufacturers or of an approved manufacturer regularly engaged in production of specialized CMMS materials or equipment.
 - iii. Bid approval does not imply nor suggest compliance of specification requirements.

1.4 Work Included and Interface Requirements

a. Installation of Central Control and Monitoring System (CMMS)

- i. The CMMS contractor shall provide all necessary hardware and software to integrate the new control system with the existing USC campus CMMS. Integration means the ability to monitor, override, change setpoints, and provide real-time bi-directional dynamic data exchange between the new control system and the existing CMMS hardware and software.
- ii. The existing USC campus CMMS is a Johnson Controls Metasys system. The CMMS is comprised of multiple supervisory controllers, monitoring and communicating with various building control systems over the USC campus Ethernet LAN system. The new building control system will be connected to, and communicate with, the existing campus CMMS over the USC campus Ethernet LAN
- iii. All new control points, monitoring points and software points shall be added to the existing USC CMMS database and shall be available for monitoring and adjustment at any computer, with current copy of Microsoft Internet Explorer software (Release 6.0 or later), that is connected to the USC LAN.
- iv. All new building software and databases shall be archived on the hard drive at the USC CMMS server. In the event that any building controller should lose its program that controller's archived software program shall be downloaded across the CMMS network from the CMMS server to the respective building controller.
- v. The CMMS contractor will provide all necessary hardware, software, and labor to allow communication with all any computer, with current copy of Microsoft Internet Explorer (Release 6.0 or later), that is connected to the USC LAN.
- vi. Integrity of the existing CMMS shall be maintained during installation.
- vii. The new building control system shall be compatible in every respect with existing Metasys CMMS hardware and software. All new controllers shall be compatible with Metasys database and Metasys software development tools.

1.5 Submittals

a. Shop Drawings, Product Data, and Samples

- i. Submittals shall be in defined packages. Each package shall be complete and shall only reference itself and previously submitted packages. The packages shall be as approved by the Architect and Engineer for Contract compliance.
- ii. Prepare an index of all submittals and shop drawings for the installation. Index shall include a shop drawing identification number, Contract Documents reference and item description.
- iii. The CCMS Contractor shall correct any errors or omissions noted in the first review.
- iv. At a minimum, submit the following:
 1. CCMS network architecture diagrams including all nodes and interconnections.
 2. Systems schematics, sequences and flow diagrams.
 3. Points schedule for each point in the CCMS, including: Point Type, Object Name, Expanded ID, Display Units, Controller type, and Address.

4. Samples of Graphic Display screen types and associated menus.
5. Detailed Bill of Material list for each system or application, identifying quantities, part numbers, descriptions, and optional features.
6. Control Damper Schedule including a separate line for each damper provided under this section and a column for each of the damper attributes, including: Code Number, Fail Position, Damper Type, Damper Operator, Duct Size, Damper Size, Mounting, and Actuator Type.
7. Control Valve Schedules including a separate line for each valve provided under this section and a column for each of the valve attributes: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Design Pressure, and Actuator Type.
8. Room Schedule including a separate line for each VAV box and/or terminal unit indicating location and address
9. Details of all CCMS interfaces and connections to the work of other trades.
10. Product data sheets or marked catalog pages including part number, photo and description for all products including software.

1.6 Record Documentation

a. Operation and Maintenance Manuals

- i. Three (3) copies of the Operation and Maintenance Manuals shall be provided to the Owner's Representative upon completion of the project. The entire Operation and Maintenance Manual shall be furnished on Compact Disc media, and include the following for the CCMS provided:
 1. Table of contents.
 2. As-built system record drawings. Computer Aided Drawings (CAD) record drawings shall represent the as-built condition of the system and incorporate all information supplied with the approved submittal.
 3. Manufacturers product data sheets or catalog pages for all products including software.
 4. System Operator's manuals.
 5. Archive copy of all site-specific databases and sequences.
 6. CCMS network diagrams.
 7. Interfaces to all third-party products and work by other trades.
- ii. The Operation and Maintenance Manual CD shall be self-contained, and include all necessary software required to access the product data sheets. A logically organized table of contents shall provide dynamic links to view and print all product data sheets. Viewer software shall provide the ability to display, zoom, and search all documents.

1.7 Warranty

a. Standard Material and Labor Warranty:

- i. Provide a one-year labor and material warranty on the CCMS.
- ii. If within twelve (12) months from the date of acceptance of product, upon written notice from the owner, it is found to be defective in operation,

workmanship or materials, it shall be replaced, repaired or adjusted at the option of the CCMS Contractor at the cost of the CCMS Contractor.

- iii. Maintain an adequate supply of materials within 100 miles of the Project site such that replacement of key parts and labor support, including programming. Warranty work shall be done during CCMS Contractor's normal business hours.

PART 2 – PRODUCTS

2.1 General Description

- a. Central Control and Monitoring (CCMS) shall use an open architecture. The system shall be designed for use on the Internet, or intranets using off the shelf, industry standard technology compatible with other owner provided networks.
- b. Central Control and Monitoring System shall consist of the following:
 - i. Standalone Network Automation Engine(s)
 - ii. Field Equipment Controller(s)
 - iii. Input/Output Module(s)
 - iv. Local Display Device(s)
 - v. Distributed User Interface(s)
 - vi. Network processing, data storage and communications equipment
 - vii. Other components required for a complete and working CCMS
- c. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of sensors, actuators, controllers and operator devices, while re-using existing controls equipment.
- d. System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. The failure of any single component or network connection shall not interrupt the execution of control strategies at other operational devices.

2.2 CCMS Architecture

- a. Automation Network
 - i. The CCMS shall network multiple user interface clients, automation engines, system controllers and application-specific controllers. Provide application and data server(s) as required for systems operation.
 - ii. The automation network shall be capable of operating at a communication speed of 100 Mbps, with full peer-to-peer network communication.
 - iii. Network Automation Engines (NAE) shall reside on the automation network.
 - iv. The automation network will be compatible with other campus-wide networks. Where indicated, the automation network shall be connected to the campus network and share resources with it by way of standard networking devices and practices.
- b. Control Network
 - i. Network Automation Engines shall provide supervisory control over the control network.

- ii. Control networks shall provide either "Peer-to-Peer," Master-Slave, or Supervised Token Passing communications, and shall operate at a minimum communication speed of 9600 baud.
 - iii. DDC Controllers shall reside on the control network.
- c. Distributed Web Based User Interface
- i. All features and functions of the dedicated user interface previously defined in this document shall be available on any computer connected directly or via a wide area or virtual private network (WAN/VPN) to the automation network and conforming to the following specifications.
 - ii. Alarms
 - 1. Alarms shall be routed directly from Network Automation Engines to PCs and servers. It shall be possible for specific alarms from specific points to be routed to specific PCs and servers. The alarm management portion of the user interface shall, at the minimum, provide the following functions:
 - a. Log date and time of alarm occurrence.
 - b. Generate a "Pop-Up" window, with audible alarm, informing a user that an alarm has been received.
 - c. Allow a user, with the appropriate security level, to acknowledge, temporarily silence, or discard an alarm.
 - d. Provide an audit trail on hard drive for alarms by recording user acknowledgment, deletion, or disabling of an alarm. The audit trail shall include the name of the user, the alarm, the action taken on the alarm, and a time/date stamp.
 - e. Provide the capability to direct alarms to an e-mail address or alphanumeric pager. This must be provided in addition to the pop up window described above. Systems that use e-mail and pagers as the exclusive means of annunciating alarms are not acceptable.
 - f. Any attribute of any object in the system may be designated to report an alarm.
 - 2. The FMS shall annunciate diagnostic alarms indicating system failures and non-normal operating conditions
 - iii. Reports and Summaries
 - 1. Reports and Summaries shall be generated and directed to the user interface displays, with subsequent assignment to printers, or disk. As a minimum, the system shall provide the following reports:
 - a. All points in the CCMS
 - b. All points in each CCMS application
 - c. All points in a specific controller
 - d. All points in a user-defined group of points
 - e. All points currently in alarm

- f. All points locked out
 - g. All CCMS schedules
 - h. All user defined and adjustable variables, schedules, interlocks and the like.
 2. Summaries and Reports shall be accessible via standard UI functions and not dependent upon custom programming or user defined HTML pages.
 3. Selection of a single menu item, tool bar item, or tool bar button shall print any displayed report or summary on the system printer for use as a building management and diagnostics tool.
 4. The system shall allow for the creation of custom reports and queries via a standard web services XML interface and commercial off-the-shelf software such as Microsoft Access, Microsoft Excel, or Crystal Reports.
- iv. Schedules
 1. A graphical display for time-of-day scheduling and override scheduling of building operations shall be provided. At a minimum, the following functions shall be provided:
 - a. Weekly schedules
 - b. Exception Schedules
 - c. Monthly calendars.
 2. Weekly schedules shall be provided for each group of equipment with a specific time use schedule.
 3. It shall be possible to define one or more exception schedules for each schedule including references to calendars
- v. Password
 1. Multiple-level password access protection shall be provided to allow the user/manager to user interface control, display, and database manipulation capabilities deemed appropriate for each user, based on an assigned password.
 2. A minimum of five levels of access shall be supported individually or in any combination as follows:
 - Level 1 = View Data
 - Level 2 = Command
 - Level 3 = Operator Overrides
 - Level 4 = Database Modification
 - Level 5 = Database Configuration
 - Level 6 = All privileges, including Password Add/Modify
 3. Operators shall be able to perform only those commands available for their respective passwords. Display of menu selections shall be limited to only those items defined for the access level of the password used to log-on.
- vi. Dynamic Color Graphics

1. The graphics application program shall be supplied as an integral part of the User Interface. Browser or Workstation applications that rely only upon HTML pages shall not be acceptable.
 2. The graphics applications shall include a create/edit function and a runtime function. The system architecture shall support an unlimited number of graphics documents (graphic definition files) to be generated and executed.
 - a. The graphics shall be able to display and provide animation based on real-time data that is acquired, derived, or entered.
- vii. Historical trending and data collection
1. Each Automation Engine shall store trend and point history data for all analog and digital inputs and outputs, as follows:
 - a. Any point, physical or calculated, may be designated for trending. Three methods of collection shall be allowed:
 - Defined time interval
 - Upon a change of value
 - b. Each Automation Engine shall have the capability to store multiple samples for each physical point and software variable based upon available memory, including an individual sample time/date stamp. Points may be assigned to multiple history trends with different collection parameters.
 2. The system shall provide a configurable data storage subsystem for the collection of historical data. Data can be stored in either Microsoft Access or SQL database format.
- viii. Trend data viewing and analysis
1. Provide a trend viewing utility that shall have access to all database points.
 2. It shall be possible to retrieve any historical database point for use in displays and reports by specifying the point name and associated trend name.
 3. The trend viewing utility shall have the capability to define trend study displays to include multiple trends
 4. Displays shall be able to be single or stacked graphs with on-line selectable display characteristics, such as ranging, color, and plot style.
 5. Display magnitude and units shall both be selectable by the operator at any time without reconfiguring the processing or collection of data. This is a zoom capability.
 6. Display magnitude shall automatically be scaled to show full graphic resolution of the data being displayed.
 7. Trend studies shall be capable of calculating and displaying calculated variables including highest value, lowest value and time based accumulation.

2.3 Network Automation Engines (NAE)

- a. The Network Automation Engine (NAE) shall be a fully user-programmable, supervisory controller. The NAE shall monitor the network of distributed

application-specific controllers, provide global strategy and direction, and communicate on a peer-to-peer basis with other Network Automation Engines.

- i. Automation network – The NAE shall reside on the automation network and shall support a subnet of system controllers.
- ii. Processor – The NAE shall be microprocessor-based with a minimum word size of 32 bits. The NAE shall be a multi-tasking, multi-user, and real-time digital control processor. Standard operating systems shall be employed. NAE size and capability shall be sufficient to fully meet the requirements of this Specification.
- iii. Memory – Each NAE shall have sufficient memory to support its own operating system, databases, and control programs, and to provide supervisory control for all control level devices.
- iv. Diagnostics – The NAE shall continuously perform self-diagnostics, communication diagnosis, and diagnosis of all panel components. The Network Automation Engine shall provide both local and remote annunciation of any detected component failures, low battery conditions, or repeated failures to establish communication.
- v. Power Failure – In the event of the loss of normal power, The NAE shall continue to operate for a user adjustable period of up to 10 minutes after which there shall be an orderly shutdown of all programs to prevent the loss of database or operating system software.
 1. During a loss of normal power, the control sequences shall go to the normal system shutdown conditions. All critical configuration data shall be saved into Flash memory.
 2. Upon restoration of normal power and after a minimum off-time delay, the controller shall automatically resume full operation without manual intervention through a normal soft-start sequence.

2.4 DDC System Controllers

a. Field Equipment Controller (FEC)

- i. The Field Equipment Controller (FEC) shall be a fully user-programmable, digital controller that communicates via BACnet MS/TP protocol.
- ii. Controllers shall be factory programmed with a continuous adaptive tuning algorithm that senses changes in the physical environment and continually adjusts loop tuning parameters appropriately. Controllers that require manual tuning of loops or perform automatic tuning on command only shall not be acceptable.
- iii. The FEC shall be assembled in a plenum-rated housing with flammability rated to UL94-5VB.
- iv. The FEC shall include a removable base to allow pre-wiring without the controller.
- v. The FEC shall accommodate the direct wiring of analog and binary I/O field points.
- vi. The FEC shall support the following types of inputs and outputs:
 1. Universal Inputs - shall be configured to monitor any of the following:
Analog Input, Voltage Mode
Analog Input, Current Mode

Analog Input, Resistive Mode

Binary Input, Dry Contact Maintained Mode

Binary Input, Pulse Counter Mode

2. Binary Inputs - shall be configured to monitor either of the following:

Dry Contact Maintained Mode

Pulse Counter Mode

3. Analog Outputs - shall be configured to output either of the following

Analog Output, Voltage Mode

Analog Output, current Mode

4. Binary Outputs - shall output the following:

24 VAC Triac

5. Configurable Outputs - shall be capable of the following:

Analog Output, Voltage Mode

Binary Output Mode

vii. The FEC shall have the ability to reside on a Field Controller Bus (FC Bus).

1. The FC Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.

2. The FC Bus shall support communications between the FECs and the NAE.

3. The FC Bus shall support a minimum of 100 IOMs and FEC in any combination.

4. The FC Bus shall operate at a maximum distance of 15,000 Ft. between the FEC and the furthest connected device.

viii. The FEC shall have the ability to monitor and control a network of sensors and actuators over a Sensor-Actuator Bus (SA Bus).

1. The SA Bus shall be a Master-Slave/Token-Passing (MS/TP) Bus supporting BACnet Standard protocol SSPC-135, Clause 9.

2. The SA Bus shall support a minimum of 10 devices per trunk.

3. The SA Bus shall operate at a maximum distance of 1,200 Ft. between the FEC and the furthest connected device.

ix. The FEC shall support, but not be limited to, the following:

1. Hot water, chilled water/central plant applications

2. Built-up air handling units for special applications

3. Terminal units

4. Special programs as required for systems control

2.5 Field Devices

a. Input/Output Module (IOM)

- i. The Input/Output Module (IOM) provides additional inputs and outputs for use in the FEC.
 - ii. The IOM shall communicate with the FEC over either the FC Bus or the SA Bus using BACnet Standard protocol SSPC-135, Clause 9.
- b. Networked Thermostat (TEC)
- i. The Networked Thermostats shall be capable of controlling the following:
 1. A four pipe fan coil system with multi-speed fan control.
 2. A two pipe fan coil with a single speed fan.
 3. The Networked Thermostat shall support remote read/write and parameter adjustment from the web based User Interface through a Network Automation Engine.
 - ii. The Networked Thermostat shall include an intuitive User Interface providing plain text messages.
 1. Two line, 8 character backlit display
 2. LED indicators for Fan, Heat, and Cool status
 3. Five (5) User Interface Keys
 - a. Mode
 - b. Fan
 - c. Override
 - d. Degrees C/F
 - e. Up/Down
 - iii. The Networked Thermostats shall provide the flexibility to support the following inputs:
 1. Integral Indoor Air Temperature Sensor
 2. Duct Mount Air Temperature Sensor
 3. Remote Indoor Air Temperature Sensor with Occupancy Override and LED Indicator.
 4. Two configurable binary inputs
 - iv. The Networked Thermostats shall provide the flexibility to support the following outputs:
 1. Three Speed Fan Control
 2. On/Off Control
 3. Floating Control
 4. Proportional (0 to 10V) Control
- c. VAV Modular Assembly (VMA)
- iii. The VAV Modular Assembly shall provide both standalone and networked direct digital control of pressure-independent, variable air volume terminal units. It shall address both single and dual duct applications.

- iv. The VAV Modular Assembly shall communicate over the FC Bus using BACnet Standard protocol SSPC-135, Clause 9.
- v. The VAV Modular Assembly shall have internal electrical isolation for AC power, DC inputs, and MS/TP communications. An externally mounted isolation transformer shall not be acceptable.
- vi. The VAV Modular Assembly shall be a configurable digital controller with integral differential pressure transducer and damper actuator. All components shall be connected and mounted as a single assembly that can be removed as one piece.
- vii. The VAV Modular Assembly shall be assembled in a plenum-rated plastic housing with flammability rated to UL94-5VB.
- viii. The integral damper actuator shall be a fast response stepper motor capable of stroking 90 degrees in 30 seconds for quick damper positioning to speed commissioning and troubleshooting tasks.
- ix. The controller shall determine airflow by dynamic pressure measurement using an integral dead-ended differential pressure transducer. The transducer shall be maintenance-free and shall not require air filters.
- x. Each controller shall have the ability to automatically calibrate the flow sensor to eliminate pressure transducer offset error due to ambient temperature / humidity effects.
- xi. The controller shall utilize a proportional plus integration (PI) algorithm for the space temperature control loops.
- xii. Each controller shall continuously, adaptively tune the control algorithms to improve control and controller reliability through reduced actuator duty cycle. In addition, this tuning reduces commissioning costs, and eliminates the maintenance costs of manually re-tuning loops to compensate for seasonal or other load changes.
- xiii. The controller shall provide the ability to download and upload VMA configuration files, both locally and via the communications network. Controllers shall be able to be loaded individually or as a group using a zone schedule generated spreadsheet of controller parameters.
- xiv. Control setpoint changes initiated over the network shall be written to VMA non-volatile memory to prevent loss of setpoint changes and to provide consistent operation in the event of communication failure.
- xv. The controller firmware shall be flash-upgradeable remotely via the communications bus to minimize costs of feature enhancements.
- xvi. The controller shall provide fail-soft operation if the airflow signal becomes unreliable, by automatically reverting to a pressure-dependent control mode.
- xvii. The controller shall interface with balancer tools that allow automatic recalculation of box flow pickup gain ("K" factor), and the ability to directly command the airflow control loop to the box minimum and maximum airflow setpoints.
- xviii. Controller performance shall be self-documenting via on-board diagnostics. These diagnostics shall consist of control loop performance measurements executing at each control loop's sample interval, which may be used to continuously monitor and document system performance. The VMA shall calculate exponentially weighted moving averages (EWMA) for each of the

following. These metrics shall be available to the end user for efficient management of the VAV terminals.

- a. Absolute temperature loop error.
 - b. Signed temperature loop error.
 - c. Absolute airflow loop error.
 - d. Signed airflow loop error.
 - e. Average damper actuator duty cycle.\
- xix. The controller shall detect system error conditions to assist in managing the VAV zones. The error conditions shall consist of:
- a. Unreliable space temperature sensor.
 - b. Unreliable differential pressure sensor.
 - c. Starved box.
 - d. Actuator stall
 - e. Insufficient cooling.
 - f. Insufficient heating.
2. The controller shall provide a flow test function to view damper position vs. flow in a graphical format. The information would alert the user to check damper position. The VMA would also provide a method to calculate actuator duty cycle as an indicator of damper actuator runtime.
- xx. The controller shall provide a compliant interface for ASHRAE Standard 62-1989 (indoor air quality), and shall be capable of resetting the box minimum airflow Based on the percent of outdoor air in the primary air stream.
- xxi. The controller shall comply with ASHRAE Standard 90.1 (energy efficiency) by preventing simultaneous heating and cooling, and where the control strategy requires reset of airflow while in reheat, by modulating the box reheat device fully open prior to increasing the airflow in the heating sequence.
- xxii. Inputs:
1. Analog inputs with user defined ranges shall monitor the following analog signals, without the addition of equipment outside the terminal controller cabinet:
 - a. 0-10 VDC Sensors
 - b. 1000ohm RTDs
 - c. NTC Thermistors
 2. Binary inputs shall monitor dry contact closures. Input shall provide filtering to eliminate false signals resulting from input "bouncing."
 3. For noise immunity, the inputs shall be internally isolated from power, communications, and output circuits.
 4. Provide side loop application for humidity control.
- xxiii. Outputs
1. Analog outputs shall provide the following control outputs:
 - a. 0-10 VDC

2. Binary outputs shall provide a SPST Triac output rated for 500mA at 24 VAC.
 3. For noise immunity, the outputs shall be internally isolated from power, communications, and other output circuits.
- xxiv. Application Configuration
1. The VAV Modular Assembly shall be configured with a software tool that provides a simple Question/Answer format for developing applications and downloading.
- xxv. Sensor Support
1. The VAV Modular Assembly shall communicate over the Sensor-Actuator Bus (SA Bus) with a Network Sensor.
 2. The VMA shall support an LCD display room sensor.
 3. The VMA shall also support standard room sensors as defined by analog input requirements.
 4. The VMA shall support humidity sensors defined by the AI side loop.
- d. Network Sensors (NS)
- i. The Network Sensors (NS) shall have the ability to monitor the following variables as required by the systems sequence of operations:
 1. Zone Temperature
 2. Zone humidity
 3. Zone setpoint
 - ii. The NS shall transmit the zone information back to the controller on the Sensor-Actuator Bus (SA Bus) using BACnet Standard protocol SSPC-135, Clause 9.
 - iii. The Network Sensors shall include the following items:
 1. A backlit Liquid Crystal Display (LCD) to indicate the Temperature, Humidity and Setpoint.
 2. An LED to indicate the status of the Override feature.
 3. A button to toggle the temperature display between Fahrenheit and Celsius.
 4. A button to initiate a timed override command
 - iv. The NS shall be available with either screw terminals or phone jack.
 - v. The NS shall be available in either surface mount or wall mount styles.

2.6 Input Devices

- a. General Requirements
 - i. Installation, testing, and calibration of all sensors, transmitters, and other input devices shall be provided to meet the system requirements.
- b. Temperature Sensors
 - i. General Requirements:
 1. Sensors and transmitters shall be provided, as outlined in the input/output summary and sequence of operations.

2. The temperature sensor shall be of the resistance type, and shall be either two-wire 1000 ohm nickel RTD, or two-wire 1000 ohm platinum RTD.
3. The following point types (and the accuracy of each) are required, and their associated accuracy values include errors associated with the sensor, lead wire, and A to D conversion:
 - ii. Room Temperature Sensors
 1. Room sensors shall be constructed for either surface or wall box mounting.
 2. Room sensors shall have the following options when specified:
 - a. Setpoint reset slide switch providing a ± 3 degree (adjustable) range.
 - b. Individual heating/cooling setpoint slide switches.
 - c. A momentary override request push button for activation of after-hours operation.
 - iii. Thermo wells
 1. When thermo wells are required, the sensor and well shall be supplied as a complete assembly, including wellhead and Greenfield fitting.
 2. Thermo wells shall be pressure rated and constructed in accordance with the system working pressure.
 3. Thermo wells and sensors shall be mounted in a threadolet or 1/2" NPT saddle and allow easy access to the sensor for repair or replacement.
 4. Thermo wells shall be constructed of 316 stainless steel.
 - iv. Outside Air Sensors
 1. Outside air sensors shall be designed to withstand the environmental conditions to which they will be exposed. They shall also be provided with a solar shield.
 2. Sensors exposed to wind velocity pressures shall be shielded by a perforated plate that surrounds the sensor element.
 3. Temperature transmitters shall be of NEMA 3R construction and rated for ambient temperatures.
 - v. Duct Mount Sensors
 1. Duct mount sensors shall mount in an electrical box through a hole in the duct, and be positioned so as to be easily accessible for repair or replacement.
 2. Duct sensors shall be insertion type and constructed as a complete assembly, including lock nut and mounting plate.
 3. For outdoor air duct applications, a weatherproof mounting box with weatherproof cover and gasket shall be used.
 - vi. Averaging Sensors
 1. For ductwork greater in any dimension than 48 inches and/or where air temperature stratification exists, an averaging sensor with multiple sensing points shall be used.

2. For plenum applications, such as mixed air temperature measurements, a string of sensors mounted across the plenum shall be used to account for stratification and/or air turbulence. The averaging string shall have a minimum of 4 sensing points per 12-foot long segment.
 3. Capillary supports at the sides of the duct shall be provided to support the sensing string.
- vii. Acceptable Manufacturers: Johnson Controls, Setra, or approved equals.
- c. Humidity Sensors
- i. The sensor shall be a solid-state type, relative humidity sensor of the Bulk Polymer Design. The sensor element shall resist service contamination.
 - ii. The humidity transmitter shall be equipped with non-interactive span and zero adjustments, a 2-wire isolated loop powered, 4-20 mA, 0-100% linear proportional output.
 - iii. The humidity transmitter shall meet the following overall accuracy, including lead loss and Analog to Digital conversion. 3% between 20% and 80% RH @ 77 Deg F unless specified elsewhere.
 - iv. Outside air relative humidity sensors shall be installed with a rain proof, perforated cover. The transmitter shall be installed in a NEMA 3R enclosure with sealtite fittings and stainless steel bushings.
 - v. A single point humidity calibrator shall be provided, if required, for field calibration. Transmitters shall be shipped factory pre-calibrated.
 - vi. Duct type sensing probes shall be constructed of 304 stainless steel, and shall be equipped with a neoprene grommet, bushings, and a mounting bracket.
 - vii. Acceptable Manufacturers: Johnson Controls, Veris Industries, and Mamac or approved equals.
- d. Differential Pressure Transmitters
- i. General Air and Water Pressure Transmitter Requirements:
 1. Pressure transmitters shall be constructed to withstand 100% pressure over-range without damage, and to hold calibrated accuracy when subject to a momentary 40% over-range input.
 2. Pressure transmitters shall transmit a 0 to 5 VDC, 0 to 10 VDC, or 4 to 20 mA output signal.
 3. Differential pressure transmitters used for flow measurement shall be sized to the flow sensing device, and shall be supplied with Tee fittings and shut-off valves in the high and low sensing pick-up lines to allow the balancing Contractor and Owner permanent, easy-to-use connection.
 4. A minimum of a NEMA 1 housing shall be provided for the transmitter. Transmitters shall be located in accessible local control panels wherever possible.
 - ii. Low Differential Water Pressure Applications (0" - 20" w.c.)
 1. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of flow meter differential pressure or water pressure sensing points.

2. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - a. .01-20" w.c. input differential pressure range.
 - b. 4-20 mA output.
 - c. Maintain accuracy up to 20 to 1 ratio turndown.
 - d. Reference Accuracy: +0.2% of full span.
 3. Acceptable Manufacturers: Setra and Mamac.
- iii. Medium to High Differential Water Pressure Applications (Over 21" w.c.)
1. The differential pressure transmitter shall meet the low pressure transmitter specifications with the following exceptions:
 - a. Differential pressure range 10" w.c. to 300 PSI.
 - b. Reference Accuracy: $\pm 1\%$ of full span (includes non-linearity, hysteresis, and repeatability).
 2. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
 3. Acceptable Manufacturers: Setra and Mamac.
- iv. Building Differential Air Pressure Applications (-1" to +1" w.c.)
1. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 2. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - a. -1.00 to +1.00 w.c. input differential pressure ranges. (Select range appropriate for system application)
 - b. 4-20 mA output.
 - c. Maintain accuracy up to 20 to 1 ratio turndown.
 - d. Reference Accuracy: +0.2% of full span.
 3. Acceptable Manufacturers: Johnson Controls, Setra or approved equals.
- v. Low Differential Air Pressure Applications (0" to 5" w.c.)
1. The differential pressure transmitter shall be of industrial quality and transmit a linear, 4 to 20 mA output in response to variation of differential pressure or air pressure sensing points.
 2. The differential pressure transmitter shall have non-interactive zero and span adjustments that are adjustable from the outside cover and meet the following performance specifications:
 - a. - 1.00" to 5.00") w.c. input differential pressure ranges. (Select range appropriate for system application.)

- b. 4-20 mA output.
 - c. Maintain accuracy up to 20 to 1 ratio turndown.
 - d. Reference Accuracy: +0.2% of full span.
 - 3. Acceptable Manufacturers: Johnson Controls, Setra or approved equals.
 - vi. Medium Differential Air Pressure Applications (5" to 21" w.c.)
 - 1. The pressure transmitter shall be similar to the Low Air Pressure Transmitter, except that the performance specifications are not as severe. Differential pressure transmitters shall be provided that meet the following performance requirements:
 - a. Zero & span: (c/o F.S./Deg. F): .04% including linearity, hysteresis and repeatability.
 - b. Accuracy: 1% F.S. (best straight line) Static Pressure Effect: 0.5% F.S. (to 100 PSIG).
 - c. Thermal Effects: <+.033 F.S./Deg. F. over 40°F. to 100°F. (calibrated at 70°F.).
 - 2. Standalone pressure transmitters shall be mounted in a bypass valve assembly panel. The panel shall be constructed to NEMA 1 standards. The transmitter shall be installed in the panel with high and low connections piped and valved. Air bleed units, bypass valves, and compression fittings shall be provided.
 - 3. Acceptable manufacturers: Johnson Controls, Setra or approved equals.
- e. Flow Monitoring
 - i. Air Flow Monitoring
 - 1. Provide airflow temperature measurement devices where indicated on the plans.
 - 2. Each measuring device shall consist of one or more multi-point measuring probes and a single microprocessor-based transmitter. Each transmitter shall operate on 24VAC.
 - 3. Each sensing point shall independently determine the airflow rate and temperature, which shall be equally weighted and averaged by the transmitter prior to output.
 - 4. Each independent airflow sensor shall have a laboratory accuracy of +/-2% of reading over the entire operating airflow range of 0-5000FPM and be wind tunnel calibrated or verified against standards that are traceable to NIST.
 - 5. The number of sensor housings provided for each location shall be

a. Duct or Plenum Area (sq. ft)	Total # Sensors/Location
b. <2	4
c. 2 to <4	6
d. 4 to <8	8
e. 8 to <16	12
f. >=16	16
 - 6. The transmitter shall be capable of communicating with the host controls using the following interface options:

7. Linear analog output signal: Field selectable, fuse protected and isolated, 0-10VDC and 4-20mA (4 wire)
8. RS-485: Field selectable Johnson Controls N2 Bus
 - a. Acceptable Manufacturers: Johnson Controls, Ebtron, Inc or approved equals.
- ii. Water Flow Monitoring
 - a. Water flow meters shall be electromagnetic type with integral microprocessor-Based electronics. The meter shall have an accuracy of 0.25%.
 - b. Acceptable manufacturers: Onicon
- f. Power Monitoring Devices
 - i. Current Measurement (Amps)
 1. Current measurement shall be by a combination current transformer and a current transducer. The current transformer shall be sized to reduce the full amperage of the monitored circuit to a maximum 5 Amp signal, which will be converted to a 4-20 mA DDC compatible signal for use by the Facility Management System.
 2. Current Transformer – A split core current transformer shall be provided to monitor motor amps.
 - a. Operating frequency – 50 - 400 Hz.
 - b. Insulation – 0.6 Kv class 10Kv BIL.
 - c. UL recognized.
 - d. Five amp secondary.
 - e. Select current ration as appropriate for application.
 - f. Acceptable manufacturers: Veris Industries
 3. Current Transducer – A current to voltage or current to mA transducer shall be provided. The current transducer shall include:
 - a. 6X input over amp rating for AC inrushes of up to 120 amps.
 - b. Manufactured to UL 1244.
 - c. Accuracy: +.5%, Ripple +1%.
 - d. Minimum load resistance 30kOhm.
 - e. Input 0-20 Amps.
 - f. Output 4-20 mA.
 - g. Transducer shall be powered by a 24VDC regulated power supply (24 VDC +5%).
 - h. Acceptable manufacturers: Veris Industries
 - g. Smoke Detectors

- i. Ionization type air duct detectors shall be furnished as specified elsewhere in Division 26 for installation under Division 23. All wiring for air duct detectors shall be provided under Division 26, Fire Alarm System.

h. Status and Safety Switches

i. General Requirements

1. Switches shall be provided to monitor equipment status, safety conditions, and generate alarms at the CCMS when a failure or abnormal condition occurs. Safety switches shall be provided with two sets of contacts and shall be interlock wired to shut down respective equipment.

ii. Current Sensing Switches

1. The current sensing switch shall be self-powered with solid-state circuitry and a dry contact output. It shall consist of a current transformer, a solid state current sensing circuit, adjustable trip point, solid state switch, SPDT relay, and an LED indicating the on or off status. A conductor of the load shall be passed through the window of the device. It shall accept over-current up to twice its trip point range.
2. Current sensing switches shall be used for run status for fans, pumps, and other miscellaneous motor loads.
3. Current sensing switches shall be calibrated to show a positive run status only when the motor is operating under load. A motor running with a broken belt or coupling shall indicate a negative run status.
4. Acceptable manufacturers: Veris Industries

iii. Air Filter Status Switches

1. Differential pressure switches used to monitor air filter status shall be of the automatic reset type with SPDT contacts rated for 2 amps at 120VAC.
2. A complete installation kit shall be provided, including: static pressure taps, tubing, fittings, and air filters.
3. Provide appropriate scale range and differential adjustment for intended service.
4. Acceptable manufacturers: Johnson Controls, Cleveland Controls or approved equals.

iv. Air Flow Switches

1. Differential pressure flow switches shall be bellows actuated mercury switches or snap acting micro-switches with appropriate scale range and differential adjustment for intended service.
2. Acceptable manufacturers: Johnson Controls, Cleveland Controls or approved equals.

v. Air Pressure Safety Switches

1. Air pressure safety switches shall be of the manual reset type with SPDT contacts rated for 2 amps at 120VAC.

2. Pressure range shall be adjustable with appropriate scale range and differential adjustment for intended service.
 3. Acceptable manufacturers: Johnson Controls, Cleveland Controls, or approved equals.
- vi. Water Flow Switches
1. Water flow switches shall be equal to the Johnson Controls P74.
- vii. Low Temperature Limit Switches
1. The low temperature limit switch shall be of the manual reset type with Double Pole/Single Throw snap acting contacts rated for 16 amps at 120VAC.
 2. The sensing element shall be a minimum of 15 feet in length and shall react to the coldest 18-inch section. Element shall be mounted horizontally across duct in accordance with manufacturers recommended installation procedures.
 3. For large duct areas where the sensing element does not provide full coverage of the air stream, additional switches shall be provided as required to provide full protection of the air stream.
 4. The low temperature limit switch shall be equal to Johnson Controls A70.

2.7 Output Devices

a. Actuators

i. General Requirements

- ii. Damper and valve actuators shall be electronic. Controls submittals shall include complete control diagrams and indicate actuator fail position as normally open or closed.
 1. Electronic damper actuators shall be direct shaft mount.
 2. Modulating and two-position actuators shall be provided as required by the sequence of operations. Damper sections shall be sized Based on actuator manufacturer's recommendations for face velocity, differential pressure and damper type. The actuator mounting arrangement and spring return feature shall permit normally open or normally closed positions of the dampers, as required. All actuators (except terminal units) shall be furnished with mechanical spring return unless otherwise specified in the sequences of operations. All actuators shall have external adjustable stops to limit the travel in either direction, and a gear release to allow manual positioning.
 3. Modulating actuators shall accept 24 VAC or VDC power supply, consume no more than 15 VA, and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA, and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal and may be used to parallel other actuators and provide true position indication. The feedback signal of one damper actuator for each separately controlled damper shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
 4. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Isolation, smoke, exhaust fan, and

other dampers, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop associated fan. Two-position actuators, as specified in sequences of operations as "quick acting," shall move full stroke within 20 seconds. All smoke damper actuators shall be quick acting.

5. Acceptable manufacturers: Johnson Controls, Mamac, or approved equals.

iii. Electronic Valve Actuators

1. Electronic valve actuators shall be manufactured by the valve manufacturer.
2. Each actuator shall have current limiting circuitry incorporated in its design to prevent damage to the actuator.
3. Modulating and two-position actuators shall be provided as required by the sequence of operations. Actuators shall provide the minimum torque required for proper valve close-off against the system pressure for the required application. The valve actuator shall be sized Based on valve manufacturer's recommendations for flow and pressure differential. All actuators shall fail in the last position unless specified with mechanical spring return in the sequence of operations. The spring return feature shall permit normally open or normally closed positions of the valves, as required. All direct shaft mount rotational actuators shall have external adjustable stops to limit the travel in either direction.
4. Modulating Actuators shall accept 24 VAC or VDC and 120 VAC power supply and be UL listed. The control signal shall be 2-10 VDC or 4-20 mA and the actuator shall provide a clamp position feedback signal of 2-10 VDC. The feedback signal shall be independent of the input signal, and may be used to parallel other actuators and provide true position indication. The feedback signal of each valve actuator (except terminal valves) shall be wired back to a terminal strip in the control panel for trouble-shooting purposes.
5. Two-position or open/closed actuators shall accept 24 or 120 VAC power supply and be UL listed. Butterfly isolation and other valves, as specified in the sequence of operations, shall be furnished with adjustable end switches to indicate open/closed position or be hard wired to start/stop the associated pump or chiller.
6. Acceptable manufacturers: Johnson Controls, or approved equals.

b. Control Relays

i. Control Pilot Relays

1. Control pilot relays shall be of a modular plug-in design with retaining springs or clips.
2. Mounting Bases shall be snap-mount.
3. DPDT, 3PDT, or 4PDT relays shall be provided, as appropriate for application.
4. Contacts shall be rated for 10 amps at 120VAC.
5. Relays shall have an integral indicator light and check button.

6. Acceptable manufacturers: Johnson Controls, Lectro, or approved equals.

c. Control Valves (Chilled Water)

- i. All modulating control valves shall be of the "pressure independent" type configured with one integrated valve body that incorporates one chamber with an adjustable Cv and a separate pressure regulating chamber used to maintain a constant differential pressure across the control surface.
- ii. Each control valve shall be individually flow tested at the factory and verified to deviate no more than $\pm 5\%$ through the selected operating pressure range. A calibrated performance tag shall be provided with each valve that verifies the flow rate in 10° rotation increments up to full rated flow (option with $1/2"$). All testing shall be performed with instruments calibrated to the requirements of ANSI/ISA-S75.11-1985, with traceability to NIST and/or ISO standards.
- iii. Control valve rangeability shall be 100:1 minimum.
- iv. Each control valve shall be subjected to 70 psid and tested to exceed ANSI/FCI 70-2-1998 leakage ratings. Class IV leakage or better is required for control valves 2" nominal size and less. Class III leakage or better is required for control valves larger than 2".
- v. In all control valves 8" and smaller, it shall be possible to modify the valve flow characteristics without removing the valve from the piping system.
- vi. Balancing valves and associated balancing shall not be required where pressure independent modulating control valves are installed.
- vii. The control valve actuator shall modulate all valves up to 8" in nominal size from 0 to 100% design flow while rotating the valve stem a maximum of 90° .
- viii. There shall be three ports installed at the factory integral to each valve and capable of being used to measure pressure or temperature. The first port shall be installed at the inlet to the valve. The second shall be installed between the Cv chamber and the pressure regulating chamber. The third shall be installed at the outlet of the valve. Should the ports not be provided as part of the valve body than they shall be installed in a spool piece and attached to the body.
- ix. The differential pressure between the first and the third port shall be used in commissioning to verify that the minimum differential pressure (typically 5 psid) required for pressure independent operation is available.
- x. The differential pressure between the first and second ports shall be used to verify proper valve operation and flow regulation. It shall be possible to verify the flow rate through the control valve using the valve stem position and the differential pressure measurement between the first and second port in the valve. If these valve features are not available, a flow meter shall be installed to verify actual flow rate in operation through the valve.
- xi. All valves shall be warranted by the manufacturer for no less than 5 years from the date of purchase
- xii. Acceptable manufacturers: Johnson Controls, Danfoss, Delta Flow

d. Control Valves (Hot Water & Steam Systems)

- i. All automatic control valves shall be fully proportioning and provide near linear heat transfer control. The valves shall be quiet in operation and fail-safe open,

closed, or in their last position. All valves shall operate in sequence with another valve when required by the sequence of operations. All control valves shall be sized by the control manufacturer, and shall be guaranteed to meet the heating and cooling loads, as specified. All control valves shall be suitable for the system flow conditions and close against the differential pressures involved. Body pressure rating and connection type (sweat, screwed, or flanged) shall conform to the pipe schedule elsewhere in this Specification.

- ii. Chilled water control valves shall be modulating plug, ball, and/or butterfly, as required by the specific application. Modulating water valves shall be sized per manufacturer's recommendations for the given application. In general, valves (2 or 3-way) serving variable flow air handling unit coils shall be sized for a pressure drop equal to the actual coil pressure drop, but no less than 5 PSI. Valves (3-way) serving constant flow air handling unit coils with secondary circuit pumps shall be sized for a pressure drop equal to 25% the actual coil pressure drop, but no less than 2 PSI. Mixing valves (3-way) serving secondary water circuits shall be sized for a pressure drop of no less than 5 PSI. Valves for terminal reheat coils shall be sized for a 2 PSIG pressure drop, but no more than a 5 PSI drop.
- iii. Ball valves shall be used for hot and chilled water applications, water terminal reheat coils, radiant panels, unit heaters, package air conditioning units, and fan coil units except those described hereinafter.
- iv. Modulating plug water valves of the single-seat type with equal percentage flow characteristics shall be used for all special applications as indicated on the valve schedule. Valve discs shall be composition type. Valve stems shall be stainless steel.
- v. Butterfly valves shall be acceptable for modulating large flow applications greater than modulating plug valves, and for all two-position, open/close applications. In-line and/or three-way butterfly valves shall be heavy-duty pattern with a body rating comparable to the pipe rating, replaceable lining suitable for temperature of system, and a stainless steel vane. Valves for modulating service shall be sized and travel limited to 50 degrees of full open. Valves for isolation service shall be the same as the pipe. Valves in the closed position shall be bubble-tight.
- vi. Acceptable manufacturers: Johnson Controls or approved equals.

2.8 Miscellaneous Devices

a. Local Control Panels

- i. All control panels shall be factory constructed, incorporating the CCMS manufacturer's standard designs and layouts. All control panels shall be UL inspected and listed as an assembly and carry a UL 508 label listing compliance. Control panels shall be fully enclosed, with perforated sub-panel, hinged door, and slotted flush latch.
- ii. In general, the control panels shall consist of the DDC controller(s), display module as specified and indicated on the plans, and I/O devices—such as relays, transducers, and so forth—that are not required to be located external to the control panel due to function. Where specified the display module shall be flush mounted in the panel face unless otherwise noted.
- iii. All I/O connections on the DDC controller shall be provide via removable or fixed screw terminals.

- iv. Low and line voltage wiring shall be segregated. All provided terminal strips and wiring shall be UL listed, 300-volt service and provide adequate clearance for field wiring.
- v. All wiring shall be neatly installed in plastic trays or tie-wrapped.
- vi. A convenience 120 VAC duplex receptacle shall be provided in each enclosure, fused on/off power switch, and required transformers.

b. Thermostats

- i. Electric room thermostats of the heavy-duty type shall be provided for unit heaters, cabinet unit heaters, and ventilation fans, where required. All these items shall be provided with concealed adjustment. Finish of covers for all room-type instruments shall match and, unless otherwise indicated or specified, covers shall be manufacturer's standard finish.

PART 3 – PERFORMANCE / EXECUTION

3.1 CCMS Specific Requirements

a. Graphic Displays

- i. Provide a color graphic system flow diagram display for each system with all points as indicated on the point list. All terminal unit graphic displays shall be from a standard design library.
- ii. User shall access the various system schematics via a graphical penetration scheme and/or menu selection. .

b. Actuation / Control Type

i. Primary Equipment

- 1. Controls shall be provided by equipment manufacturer as specified herein.
- 2. All damper and valve actuation shall be electric.

ii. Air Handling Equipment

- 1. All air handlers shall be controlled with a HVAC-DDC Controller
- 2. All damper and valve actuation shall be electric.

iii. Terminal Equipment:

- 1. Terminal Units (VAV, FPVAV, etc.) shall have electric damper and valve actuation.
- 2. All Terminal Units shall be controlled with HVAC-DDC Controller)

3.2 Installation Practices

a. CCMS Wiring

- i. All conduit, wiring, accessories and wiring connections required for the installation of the Central Control and Monitoring System, as herein specified, shall be provided by the CCMS Contractor unless specifically shown on the Electrical Drawings under Division 26 Electrical. All wiring shall comply with the requirements of applicable portions of Division 26 and all local and national electric codes, unless specified otherwise in this section.
- ii. All CCMS wiring materials and installation methods shall comply with CCMS manufacturer recommendations.

- iii. The sizing, type and provision of cable, conduit, cable trays, and raceways shall be the design responsibility of the CCMS Contractor. If complications arise, however, due to the incorrect selection of cable, cable trays, raceways and/or conduit by the CCMS Contractor, the Contractor shall be responsible for all costs incurred in replacing the selected components.
- iv. Class 2 Wiring
 - 1. All Class 2 (24VAC or less) wiring shall be installed in conduit unless otherwise specified.
 - 2. Conduit is not required for Class 2 wiring in concealed accessible locations. Class 2 wiring not installed in conduit shall be supported every 5' from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements.
- v. Class 2 signal wiring and 24VAC power can be run in the same conduit. Power wiring 120VAC and greater cannot share the same conduit with Class 2 signal wiring.
- vi. Provide for complete grounding of all applicable signal and communications cables, panels and equipment so as to ensure system integrity of operation. Ground cabling and conduit at the panel terminations. Avoid grounding loops.
- b. CCMS Raceway
 - i. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 1/2".
 - ii. Where it is not possible to conceal raceways in finished locations, surface raceway (Wiremold) may be used as approved by the Architect.
 - iii. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
 - iv. Flexible Metal Conduit shall be used for vibration isolation and shall be limited to 3 feet in length when terminating to vibrating equipment. Flexible Metal Conduit may be used within partition walls. Flexible Metal Conduit shall be UL listed.
- c. Penetrations
 - i. Provide fire stopping for all penetrations used by dedicated CCMS conduits and raceways.
 - ii. All openings in fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
 - iii. All wiring passing through penetrations, including walls shall be in conduit or enclosed raceway.
 - iv. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true, and square.
- d. CCMS Identification Standards
 - i. Node Identification. All nodes shall be identified by a permanent label fastened to the enclosure. Labels shall be suitable for the node location.
 - 1. Cable types specified in Item A shall be color coded for easy identification and troubleshooting.

- e. CCMS Panel Installation
 - i. The CCMS panels and cabinets shall be located as indicated at an elevation of not less than 2 feet from the bottom edge of the panel to the finished floor. Each cabinet shall be anchored per the manufacturer's recommendations.
 - ii. The CCMS contractor shall be responsible for coordinating panel locations with other trades and electrical and mechanical contractors.
- f. Input Devices
 - i. All Input devices shall be installed per the manufacturer recommendation
 - ii. Locate components of the CCMS in accessible local control panels wherever possible.
- g. HVAC Input Devices – Genera1
 - i. All Input devices shall be installed per the manufacturer recommendation
 - ii. Locate components of the CCMS in accessible local control panels wherever possible.
 - iii. The mechanical contractor shall install all in-line devices such as temperature wells, pressure taps, airflow stations, etc.
 - iv. Input Flow Measuring Devices shall be installed in strict compliance with ASME guidelines affecting non-standard approach conditions.
 - v. Outside Air Sensors
 - 1. Sensors shall be mounted on the North wall to minimize solar radiant heat impact or located in a continuous intake flow adequate to monitor outside air conditions accurately.
 - 2. Sensors shall be installed with a rain proof, perforated cover.
 - vi. Water Differential Pressure Sensors
 - 1. Differential pressure transmitters used for flow measurement shall be sized to the flow-sensing device.
 - 2. Differential pressure transmitters shall be supplied with tee fittings and shut-off valves in the high and low sensing pick-up lines.
 - 3. The transmitters shall be installed in an accessible location wherever possible.
 - vii. Medium to High Differential Water Pressure Applications (Over 21" w.c.):
 - 1. Air bleed units, bypass valves and compression fittings shall be provided.
 - viii. Building Differential Air Pressure Applications (-1" to +1" w.c.):
 - 1. Transmitters exterior sensing tip shall be installed with a shielded static air probe to reduce pressure fluctuations caused by wind.
 - 2. The interior tip shall be inconspicuous and located as shown on the drawings.
 - ix. Duct Temperature Sensors:
 - 1. Duct mount sensors shall mount in an electrical box through a hole in the duct and be positioned so as to be easily accessible for repair or replacement.

2. The sensors shall be insertion type and constructed as a complete assembly including lock nut and mounting plate.
 3. For ductwork greater in any dimension than 48 inches or where air temperature stratification exists such as a mixed air plenum, utilize an averaging sensor.
 4. The sensor shall be mounted to suitable supports using factory approved element holders.
- x. Space Sensors:
1. Shall be mounted per ADA requirements.
 2. Provide lockable tamper-proof covers in public areas and/or where indicated on the plans.
- xi. Low Temperature Limit Switches:
1. Install on the discharge side of the first water or steam coil in the air stream.
 2. Mount element horizontally across duct in a serpentine pattern insuring each square foot of coil is protected by 1 foot of sensor.
 3. For large duct areas where the sensing element does not provide full coverage of the air stream, provide additional switches as required to provide full protection of the air stream.
- xii. Air Differential Pressure Status Switches:
1. Install with static pressure tips, tubing, fittings, and air filter.
- xiii. Water Differential Pressure Status Switches:
1. Install with shut off valves for isolation.
- h. HVAC Output Devices
- i. All output devices shall be installed per the manufacturers recommendation. The mechanical contractor shall install all in-line devices such as control valves, dampers, airflow stations, pressure wells, etc.
 - ii. Actuators: All control actuators shall be sized capable of closing against the maximum system shut-off pressure. The actuator shall modulate in a smooth fashion through the entire stroke. When any pneumatic actuator is sequenced with another device, pilot positioners shall be installed to allow for proper sequencing.
 - iii. Control Dampers: Shall be opposed blade for modulating control of airflow. Parallel blade dampers shall be installed for two position applications.
 - iv. Control Valves: Shall be sized for proper flow control with equal percentage valve plugs. The maximum pressure drop for water applications shall be 5 PSI. The maximum pressure drop for steam applications shall be 7 PSI.
 - v. Electronic Signal Isolation Transducers: Whenever an analog output signal from the Central Control and Monitoring System is to be connected to an external control system as an input (such as a chiller control panel), or is to receive as an input a signal from a remote system, provide a signal isolation transducer. Signal isolation transducer shall provide ground plane isolation between systems. Signals shall provide optical isolation between systems

3.3 Training

- a. The CCMS contractor shall provide the following training services:

- i. One day of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the CCMS software layout and naming conventions, and a walk through of the facility to identify panel and device locations.

3.4 Commissioning

- a. Fully commission all aspects of the Central Control and Monitoring System work.
- b. Acceptance Check Sheet
 - i. Prepare a check sheet that includes all points for all functions of the CCMS as indicated on the point list included in this specification.
 - ii. Submit the check sheet to the Engineer for approval
 - iii. The Engineer will use the check sheet as the basis for acceptance with the CCMS Contractor.
- c. VAV box performance verification and documentation:
 - i. The CCMS Contractor shall test each VAV box for operation and correct flow. At each step, after a settling time, box air flows and damper positions will be sampled. Following the tests, a pass/fail report indicating results shall be produced and submitted to the engineer for review. Possible results are Pass, No change in flow between full open and full close, Reverse operation or Maximum flow not achieved. The report shall be submitted as documentation of the installation.
 - ii. The CCMS Contractor shall issue a report based on a sampling of the VAV calculated loop performance metrics. The report shall indicate performance criteria, include the count of conforming and non-conforming boxes, list the non-conforming boxes along with their performance data.
- d. Promptly rectify all listed deficiencies and submit to the Engineer that this has been done.

3.5 SEQUENCE OF OPERATION

a. GENERAL

i. Power - Fail Restart:

1. In the event of a power failure the FMS computer will analyze the status of all controlled equipment and compare it with normal occupancy scheduling. The equipment will then be started or stopped as necessary to prevent all equipment from coming on at the same time.

ii. FMS Monitoring:

1. Refer to the attached Input/Output schedule for a listing of all monitoring and override points and for additional software features.

iii. Optimal Start:

1. All scheduled HVAC equipment will be started based on an optimal start feature that will calculate the approximate time the unit will have to be started prior to scheduled start time in order for the space temperature to be at setpoint at scheduled occupancy.
2. Once space temperatures reach occupied setpoint O.A. dampers will be modulated open. Whenever the unit goes in the unoccupied mode the O.A. damper will be closed.

iv. Night High Limit and Night Low Limit:

1. During unoccupied periods scheduled fan powered VAV boxes will be energized whenever space temperature drops below a night low limit setpoint of 65 degrees(adjustable).
2. During unoccupied periods scheduled fan powered boxes, VAV boxes and associated AHU's will be energized whenever space temperature exceeds a a night high limit of 85 degrees(adj).

b. MAXCY COLLEGE

i. CHILLED WATER SYSTEM:

1. Secondary Chilled Water Pump Start-Stop Control:

- a. Building chilled water pumps will operate in a primary and standby configuration. In the event of a failure of a primary pump an alarm will be given at the FMS computer and the standby pump will automatically be started. Primary and standby pumps will be automatically alternated on a weekly basis.

2. Secondary Chilled Water Pump Speed Control:

- a. Whenever the DDC controller detects that a pump is on, it will sense the differential pressure in the chilled water system and modulate the variable speed drive of that pump as required to maintain the differential pressure set point. Loop pressure set point shall be reset based on flow rate.

3. Chilled Water Temperature Control:

- a. The chilled water for this building will be provided by the East Energy Facility. CHW return temperature back to the energy plant will be controlled at 57 degrees (adjustable) by modulating the main building CHW valve.
- b. All hardware and software shall be provided to accomplish this control sequence but sequence and control shall be disabled upon initial startup and shall not be enable unless directed by the engineer.

ii. HOT WATER SYSTEM:

1. HW Pump Start Stop Control:

- a. H.W. pumps will operate in a primary and standby configuration. In the event of a failure of a primary pump an alarm will be given at the FMS computer and the standby pump will be automatically started. Primary and standby pumps will be automatically alternated on a weekly basis.

2. Hot Water Pump Speed Control:

- a. Whenever the DDC controller detects that a pump is on, it will sense the differential pressure in the hot water system and modulate the variable speed drive of that pump as required to maintain the differential pressure setpoint. Loop pressure set point shall be reset based on flow rate.

3. Heat Exchanger Hot Water Temperature Control:

- a. The DDC controller will sense the hot water supply temperature and outside air temperature in order to determine the hot water supply temperature setpoint. The setpoint will be reset according to the following adjustable reset schedule.

Outside Air Temperature	Hot Water Supply Temperature
20°F	180°F
65°F	120°F

- b. The DDC controller will modulate the HEX steam control valves as required to maintain the calculated hot water supply temperature setpoint.
- iii. Fan-coils.
 - 1. Start/Stop:
 - a. The unit will be started and stopped based on a time of day schedule from the FMS.
 - 2. Temperature Control:
 - a. Room setpoint shall be maintained by modulating the FCU CHW and HW valve as necessary to maintain setpoint.
 - iv. OAUs
 - 1. General:
 - a. Outside Air Units shall supply neutral temperature air to the building.
 - b. Provide supply air discharge sensor for monitoring only.
 - 2. Start/Stop:
 - a. The unit will be started and stopped based on a time of day schedule from the FMS.
 - b. Once the start sequence is initiated, the outside and exhaust air dampers shall open. Once the outside air and exhaust air dampers are proven open, the supply and exhaust fan shall be commanded to run
 - 3. Temperature/Humidity Control Summer:
 - a. During summer mode (ambient dew-point is above summer supply air dew-point set point), mechanical cooling and dehumidification is enabled and staged to maintain supply air dew-point set point. Heat is disabled during this mode as the CWT utilizes heat recovery for reheating supply air. When ambient temperature above outside air temperature to enable AC, and ambient dew point is below supply air dew-point set point (hot and dry ambient conditions) shall enable AC and

control supply air temperature below maximum supply air temperature set point.

4. Temperature/Humidity Control Winter:
 - a. During winter mode, supply air is preheated through energy recovery, and final heated as required to maintain winter supply air temperature set point.
- v. Exhaust Fans:
 1. Exhaust fans will be interlocked and controlled as indicated on fan schedule.
- vi. Kitchen Hood and Hood MUA Unit:
 1. Kitchen Hood MUA unit will be interlocked to operate when kitchen hood exhaust fan is manually cut on. MUA unit to be provided with factory controls.
- vii. Energy Monitoring:
 1. Provide monitoring of building steam and building CHW BTU consumption as well as building electrical and domestic water consumption.

END OF SECTION

SECTION 23 0593TESTING, ADJUSTING AND BALANCING FOR HVACPART 1: GENERAL1.1 SCOPE:

a. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this Section.

b. The Contractor shall obtain the services of an independent NEBB or AABC certified testing and balancing organization, headed by a Professional Engineer, under whose direction and supervision the balancing and testing of the systems shall be conducted. The independent organization shall have no affiliation with the Mechanical or Sheet Metal Contracting firm on the job and shall be responsible for compiling, verifying and submitting all the final readings required by the Specifications for approval.

c. Before commencing with the balancing of the systems, the Contractor shall submit for approval the name of the testing and balancing organization under whose direct supervision the adjustments as specified shall be made. The submission shall also include the methods and a list of instruments proposed to be used to adjust and balance the air systems. The list of instruments shall include serial numbers and dates of calibration. All instruments shall be calibrated within six months before tests. The Contractor shall also submit the testing report of all the instruments to be used on this project, performed by a testing agency in the last six months, to the Architect for his approval.

d. Six copies of complete balancing data shall be delivered to the Architect for approval of balancing of all systems.

e. Where test result indicate that air quantities at any system fan are below or the excess of the specified amount, the Contractor shall, at his own expense, change driving pulley ratio or shall make approved changes to obtain the specified or scheduled air quantities.

f. The air flow of any outlet shall not vary more than 10% from the quantity shown on the plans. If, on inspection by the Architect it is found that any outlet does not come within the stated tolerance, the entire system shall be declared out of balance and shall be readjusted until some has been balanced to satisfy the above condition. In the event that a system has been declared out of balance, an application for reinspection, a revised tabulation of readings as previously specified shall be included.

g. The independent organization shall thoroughly review the location of all fresh air dampers, return dampers, spill dampers, quadrant dampers, splitter dampers, bypass dampers, face dampers, fire dampers, registers, grilles, diffusers, variable volume. The purpose of the review is to finalize the optimum locations for dampers and balancing valves shown on the drawings.

h. Testing and Balancing Contractor shall have the responsibility of coordinating with the commissioning agent and arrange for verification and witnessing of testing and balancing by the same.

i. The balancing report must contain the approval signature of the commissioning agent indicating he has been notified and has witnessed the balancing process.

1.2 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

a. Manufacturer's cut sheets for all equipment to be used.

- b. Sample balancing charts and forms.
- c. Completed final balancing data.

PART 2: PRODUCTS

2.1 INSTRUMENTATION:

a. Instruments for use in the test and balancing procedures shall be of first quality and be accurately calibrated at the time of use. The following list is provided to indicate the instruments expected, however, other instruments as necessary to properly perform the work will be provided and subject to approval of the Architect.

1. Inclined manometer calibrated in no less than .006-inch divisions.
2. Combination inclined and vertical manometer (0 to 10 inch is generally the most useful).
3. Pitot Tubes. (Usually 18 and 48 inch tube covers most balance requirements.
4. Tachometer. This instrument should be of the high quality self-timing type.
5. Clamp-on ampere meter with voltage scales.
6. Deflecting vane anemometer.
7. Rotating vane anemometer.
8. Thermal type (hot wire) anemometer.
9. Hook gage.
10. Dial and glass stem thermometers.
11. Sling psychrometer.

b. The accuracy of calibration of the field instruments used is of the utmost importance. All field instruments used in the balance should have been calibrated at least within the previous three months. Naturally, any suspect instruments should be checked more frequently.

PART 3: EXECUTION

3.1 SYSTEM START-UP:

a. Starting date for mechanical system shall be scheduled well in advance of expected completion date and shall be established a minimum of two weeks prior to acceptance date. The system shall be in full operation with all equipment functional prior to acceptance date.

b. Performance readings shall be taken and recorded on all air and water distribution devices and the system shall be balanced out prior to acceptance. Balancing of the system shall be accomplished with duct dampers and only minor adjustments made with grille dampers. Record and submit results in table form along side of scheduled quantities.

c. All controls shall be calibrated by qualified personnel prior to acceptance date. Thermostats shall be in close calibration with one another and shall operate their respective units without interference from adjacent units.

d. TAB report should include a full static pressure profile of each AHU showing pressure drops across dampers, filters, coils, fans, etc. All units shall be checked out thoroughly and the following information recorded on each machine. Check sheets shall be included in Operating and Maintenance instructional Manual.

1. Pumps (Each):

- (a) Pump No.
- (b) Manufacturer and Model
- (c) Motor Manufacturer, Frame and Nameplate Data
- (d) Water Flow Rate, GPM
- (e) Water Pressure Increase (Ft. H₂O)
- (f) Motor Amperage
- (g) Voltage
- (h) RPM
- (i) Check Lead-Lag Controls

2. Coils (Each):

- (a) Unit Number and Location
- (b) Manufacturer and Model No.
- (c) Return Air, Supply Air and Outside Air Temperature
- (d) Discharge Temperature, Cooling or Heating
- (e) Air Flow CFM, Entering and Leaving Static Pressure
- (f) Hot Water, Pressure Drop, and EWT, LWT
- (g) Water Flow

3. fanciol Units (Each):

- (a) Unit No. and Location
- (b) Supply Air Static Pressure and Temperature
- (c) Control Air Pressure
- (d) Maximum and Minimum CFM Settings
- (e) Check Control Sequence
- (f) Check Fan Operation
- (g) Check Hot Water Coil Water Pressure Drop
- (h) Check EAT and LAT at Hot Water Coil

4. Fans and Miscellaneous:

- (a) Unit No. and Use
- (b) Manufacturer and Model
- (c) Motor Nameplate Data
- (d) Motor Amps and Volts
- (e) Entering and Leaving Static Pressure
- (f) Fan RPM
- (g) Damper Operation

e. Contractor shall have in his possession a copy of a letter from the responsible Control Representative stating that the controls have been installed according to the plans; that the control sequence has been checked and that all controls have been calibrated.

f. Each unit shall be marked with 3" high letters in accordance with mechanical plan designation. Each panel and breaker number for all equipment shall be marked. Each control device shall be labeled.

End of Section

SECTION 23 0700

HVAC INSULATION

PART 1: GENERAL

1.1 DESCRIPTION:

- a. This section of specifications and related drawings describe requirements pertaining to insulation.
- b. Provide all insulation in conjunction with equipment, piping and ductwork furnished under this division.
- c. The provisions of Section 23 0500 – Common Work Results for HVAC, apply to all the work in this section.

1.2 QUALITY ASSURANCE:

- a. Products of the manufacturers listed under MATERIALS will be acceptable for use for the specific functions noted. Adhesives, sealers, vapor barriers, and coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.
- b. Materials shall be applied subject to their temperature limits. Any methods of application of insulating materials or finishes not specified in detail herein shall be in accordance with the particular manufacturer's published recommendations.
- c. Insulation shall be applied by experienced workers regularly employed for this type of work.

1.3 SUBMITTALS: Submit the following in accordance with Section 23 0500 – Common Work Results for HVAC:

- a. Catalog cuts.
- b. Materials ratings.
- c. Insulation instructions.

1.4 RATING:

- a. Insulation and accessories such as adhesives, mastics, cements, tape and jackets, unless specifically expected, shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50. Materials that are factory applied shall be tested individually. No fugitive or corrosive treatments shall be employed to impart flame resistance.
- b. Flame spread and smoke developed ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, NFPA No. 255, ASTM E-84, UL 723.
- c. Products of their shipping cartons shall bear a label indicating that flame and smoke ratings do not exceed above requirements.

- d. Treatment of jackets or facings to impart flame and smoke safety shall be permanent. The

use or water-soluble treatment is prohibited.

- e. Certify in writing, prior to installation, that products to be used will meet RATING criteria.

PART 2: PRODUCTS

2.1 PIPE INSULATION:

a. Materials shall be heavy density fiberglass with an all-service jacket composed of an outer layer of vinyl, fiberglass scrim cloth, aluminum foil, and kraft paper, in that order, from outside to inside of pipe covering. To be used on all lines from -60°F. to 450°F., (asbestos-free calcium silicate) for temperatures over 450°F.

1. Domestic cold water supply, hot water supply and return, cold water make up lines and hot water heating supply and return piping.
2. Steam supply and condensate return piping.

b. Materials shall be Rigid closed-cell polyisocyanurate thermal insulation bunstock, fabricated into shapes required to insulate pipe, valves, fittings, vessels, and/or special shapes. Density and physical properties are as needed for ASHRAE 90.1 compliance. Polyiso material shall not be produced with, or contain, any of the United States EPA regulated CFC compounds listed in the Montreal Protocol of the United Nations Environmental Program. Vapor retarders may consist of sheet-type film, such as cross-laminated high density polyethylene sheeting, polyvinylidene chloride polymer film, or similar materials. Polyiso insulation is secured to the pipe with filament-reinforced tape, such as the synthetic filament-reinforced polyester film backing tape with non-thermosetting rubber adhesive, wrapped on a 3 inch paper core manufactured by 3M. Surface finish to be with a high emissivity such as painted metal, PVC or All Service Jacket (ASJ).

1. Chilled water supply and return piping, including drain lines from chilled water coils or apparatus handling chilled water.

b. Thicknesses:

1. Chilled water supply and return piping, drain lines: Pipe size 2" and larger - 1-1/2", Pipe size 1 1/2" and smaller - 1".

2. Domestic cold water supply, domestic hot water supply and return, cold water make up lines, - inside only, Sanitary waste piping serving drains handling cold condensate - Pipe size 2" and larger - 1-1/2", Pipe size 1 1/2" and smaller - 1"..

3. Hot water heating supply and return lines - Pipe size 2" and larger - 1-1/2", Pipe size 1 1/2" and smaller - 1".

4. Low pressure steam and condensate return lines (below 16 PSIG). All Pipe sizes – 3"

5. All pipe insulation thicknesses shall meet or exceed paragraph 503.2.8 and table 503.2.8 of the 2006 International Energy Conservation Code.

2.2 EQUIPMENT:

a. Pump and other equipment handling chilled water. Insulate with closed cell polyiso blocks cut to fit and finished with 8 oz. canvas jacket. Pump insulation shall be removable to allow servicing of pump.

b. Tanks and other equipment handling hot water (not factory insulated). Insulate with semi-rigid fiberglass board 1/2" thick. Cut to fit and cover with 8 oz. canvas jacket.

2.3 DUCT INSULATION:

a. Materials. Insulation shall be Owens-Corning as specified hereinafter or products of Certain-Teed/St. Gobain or Johns Mansville. Adhesives shall be as manufactured by 3-M Foster or Insulation Manufacturer. Insulation shall have composite (insulation, jacket and adhesive) fire and smoke hazard rating as tested by ASTM E-84, not exceeding Flame Spread -25 and Smoke Developed -50.

b. All duct insulation thicknesses shall meet or exceed paragraph 503.2.78 of the 2006 International Energy Conservation Code.

PART 3: EXECUTION

3.1 PIPE INSULATION:

a. Application:

1. Insulation and surfaces to be insulated shall be clean and dry when insulation is installed and during the application of any finish.

b. Fiberglass Insulation:

1. All fiberglass pipe covering shall be furnished with self-seal lap and 3" wide butt joint strips. The release paper is pulled from adhesive edge, pipe covering closed tightly around pipe and self-seal lap rubbed hard in place with the blunt edge of an insulation knife. This procedure applies to longitudinal as well as circumferential joints. Under no circumstances will staples be allowed. Care shall be taken to keep jacket clean, as it is the finish on all exposed work. All adjoining insulation sections shall be firmly butted together before butt joint strip is applied, and all chilled water and cold water service lines shall have vapor seal mastic thoroughly coated to pipe at butt joints every 21' and at all fittings. All insulation outside shall be protected with aluminum weather-proof jacketing with lap-seal, and factory attached moisture barrier. The aluminum shall be .016 gauge (3303-H14 alloy) of embossed pattern. It shall be applied with a 2" circumferential and 1-1/2" longitudinal lap and be secured with aluminum bands 3/8" wide 8" o.c.. All elbows shall be covered with the same .016 aluminum with factory applied moisture barrier. All fittings, valve bodies, unions, and flanges shall be finished as follows:

(a) Apply molded or segmental insulation to fittings equal in thickness to the insulation on adjoining pipe and wire in place with 2#14 copper wires.

(b) Apply a skim coat of insulating cement to the insulated fitting, if needed, to produce a smooth surface. After cement is dry, apply Owens-Corning Fiberglass Fitting Mastic, Type C, UL labeled.

(c) Wrap the fitting with fiberglass reinforcing cloth overlapping the preceding layer by 1 to 2". Also, overlap mastic and cloth by 2" on adjoining sections of pipe insulation.

(d) Apply a second coat of mastic over cloth, working it well into mesh of cloth and smooth the surface. Mastic to be applied at the rate of 40 square feet per gallon. All flanges and fittings

on hot and cold lines in utility tunnels shall be insulated according to above. Omit insulation on flanges and unions over 60 degrees F. If painting is required, no sizing is necessary. To maintain the non-combustibility of the system only Glidden acrylic latex paint (#5370) is to be used.

(e) All piping exposed to view (equipment rooms, etc.) shall be covered with an 8 oz. canvas jacket.

3.2 DUCT INSULATION:

a. Duct insulation R values and thickness must meet or exceed the requirements of paragraph 503.2.7 2006 International Energy Conservation Code.

b. All vapor barriers and joints shall be sealed to prevent condensation. Clean and dry all ductwork before installing insulation. All weld joints shall be wire brushed and give one (1) coat of red lead before insulating. Staples will not be permitted in insulation.

c. Lined Duct:

1. All ducts are to be wrapped. Does not use duct liner.

d. Wrapped Duct:

1. All ducts (except exhaust and neutral temperature outside air ducts) unless noted otherwise on plans shall be insulated by wrapping with 2" thick fiberglass with vapor barrier jacket with joints overlapped a minimum of two inches. Insulation shall be adhered to duct with non-combustible insulation bonding adhesive applied in 4" strips, 8" on center. All joints shall be secured with flare door staples on 3" centers through all laps over tape. Use mastic for securing insulation. Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands. Provide rigid board insulated where exposed in mechanical rooms.

2. Ductwork exposed to weather shall be insulated as follows: Seal all joints with hard cast sealer, apply 2" thick polystyrene insulation cover with two (2) individual layers of glassfab and white mastic. Paint to match background color.

e. Supply Diffusers:

1. Insulate supply air diffuser bodies similar to the duct system to protect against the possibility of condensation.

End of Section

SECTION 260500 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Common electrical installation requirements.

1.3 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Provide access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Coordinate sleeve selection and application with selection and application of firestopping.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Coordinate sleeve selection and application with selection and application of firestopping
- C. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- D. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

- J. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- K. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 FIELD QUALITY CONTROL

- A. Inspect installed sleeve and sleeve-seal installations and associated firestopping for damage and faulty work.

END OF SECTION 260500

SECTION 260519 - CONDUCTORS AND CABLES

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. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers or equal:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Senator Wire & Cable Company.
 - 4. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Hubbell Power Systems, Inc.
 2. O-Z/Gedney; EGS Electrical Group LLC.
 3. 3M; Electrical Products Division.
 4. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Class 1 Control Circuits: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Support cables according to Division 26 Section "Electrical Supports and Seismic Restraints."
- E. Identify and color-code conductors and cables according to Division 26 Section "Electrical Identification."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm).

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger, unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.

3.3 INSTALLATION

- A. 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.
- B. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade, unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.
 - 2. For grounding electrode system, install at least three rods spaced at least 20 feet from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

END OF SECTION 260526

SECTION 260529 - ELECTRICAL SUPPORTS AND SEISMIC RESTRAINTS

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. Hangers and supports for electrical equipment and systems.
 - 2. Seismic restraints for electrical equipment and systems.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IBC: International Building Code.
- C. IMC: Intermediate metal conduit.
- D. RMC: Rigid metal conduit.
- E. Seismic Restraint: A structural support element such as a metal framing member, a cable, an anchor bolt or stud, a fastening device, or an assembly of these items used to transmit seismic forces from an item of equipment or system to building structure and to limit movement of item during a seismic event.

1.4 QUALITY ASSURANCE

- A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent. This site is a Seismic 'D' Classification.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed under this Project, with a minimum structural safety factor of five times the applied force.
- B. Steel Slotted Support Systems: Comply with MFMA-3, factory-fabricated components for field assembly.
 - 1. Channel Dimensions: Selected for structural loading.
- C. Raceway and Cable Supports: As described in NECA 1.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. 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.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - 3. Concrete Inserts: Steel or malleable-iron slotted-support-system units similar to MSS Type 18; complying with MFMA-3 or MSS SP-58.
 - 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - 5. Through Bolts: Structural type, hex head, high strength. Comply with ASTM A 325.
 - 6. Toggle Bolts: All-steel springhead type.
 - 7. Hanger Rods: Threaded steel.

2.2 SEISMIC-RESTRAINT COMPONENTS

- A. Angle and Channel-Type Brace Assemblies: Steel angles or steel slotted-support-system components; with accessories for attachment to braced component at one end and to building structure at the other end.

- B. Cable Restraints: ASTM A 603, zinc-coated, steel wire rope attached to steel or stainless-steel thimbles, brackets, swivels, and bolts designed for restraining cable service.

- 1. Seismic Mountings, Anchors, and Attachments: Devices as specified in Part 2 "Support, Anchorage, and Attachment Components" Article, selected to resist seismic forces.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 for application of hangers and supports for electrical equipment and systems, except if requirements in this Section are stricter.
- B. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps using spring friction action for retention in support channel.
- C. 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.

3.2 SUPPORT AND SEISMIC-RESTRAINT INSTALLATION

- A. Comply with NECA 1 for installation requirements, except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, as permitted in NFPA 70.
- C. 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:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

4. 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.
5. To Light Steel: Sheet metal screws.
6. 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.

- D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 INSTALLATION OF SEISMIC-RESTRAINT COMPONENTS

- A. Restraint Cables: Provide #12 slack steel cables on all recessed light fixtures. Provide two cables on all 2'x4' recessed fixtures attached from structure to diagonally opposite corners of fixtures. Provide one cable on each smaller fixture.
- B. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, upper truss chords of bar joists, or at concrete members.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES

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 raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RGS: Rigid galvanized steel conduit.
- F. RNC: Rigid nonmetallic conduit.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70-2008.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Rigid Steel Conduit: ANSI C80.1.

- B. IMC: ANSI C80.6.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Fittings for EMT: Steel , set-screw (indoors), weatherproof compression (outdoors).

2.2 NONMETALLIC CONDUIT AND TUBING

- A. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- B. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material. Provide rigid steel conduit elbows.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Metal Floor Boxes: Cast metal semi-adjustable, rectangular.
- B. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- C. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. Description: Comply with SCTE 77.
 - 1. Color of Frame and Cover: Gray.
 - 2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
 - 3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - 4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - 5. Cover Legend: Molded lettering, "ELECTRICAL."
 - 6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit.
 - 2. Concealed Conduit, Aboveground: EMT.
 - 3. Underground Conduit: RNC, Type EPC-40 PVC, direct buried.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
 - 6. Application of Handholes and Boxes for Underground Wiring:
 - a. Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete, SCTE 77, Tier 15 structural load rating.
- B. Comply with the following indoor applications, unless otherwise indicated:
 - 1. Exposed, Not Subject to Physical Damage: EMT.
 - 2. Exposed and Subject to Severe Physical Damage: IMC.
 - 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 5. Damp or Wet Locations: IMC.
 - 6. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: Indoors -3/4-inch (16-mm), outdoors- 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Electrical Supports and Seismic Restraints."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from RNC to rigid steel conduit, or IMC before rising above the floor, whether exposed or within a wall.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- L. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations.
- M. 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.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earthwork" for pipe less than 6 inches (150 mm) in nominal diameter.
2. Install backfill as specified in Division 31 Section "Earthwork."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 2 Section "Earthwork."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations installing fittings.

END OF SECTION 260533

SECTION 260553 - ELECTRICAL IDENTIFICATION

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. Identification for conductors and control cable.
 2. Underground-line warning tape.
 3. Equipment identification labels.

1.3 QUALITY ASSURANCE

- A. Comply with NFPA 70-2008.

1.4 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

- B. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2.2 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.
 1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.
 2. Compounded for permanent direct-burial service.
 3. Embedded continuous metallic strip or core.
 4. Printed legend shall indicate type of underground line.

2.3 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with black letters on a white background. Minimum letter height shall be 3/8 inch (10 mm).

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Power-Circuit Conductor Identification: For secondary conductors in pull and junction boxes use color-coded tape.
- B. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape.

- C. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
- D. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. Labeling Instructions:
 - a. Laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where 2 lines of text are required, use labels 2 inches (50 mm) high.
 - 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealed electrical items.
 - c. Disconnect switches.
 - d. Enclosed circuit breakers.
 - e. Fire-alarm control panel and annunciators.
 - f. Monitoring and control equipment.
 - g. Contactors.
 - h. Generator Sets
 - i. Automatic Transfer Switches

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Color-Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for conductors.
 - 1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 - 2. Colors for 120/208-V Circuits:

- a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White
 - e. Ground: Green
3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, overcurrent protective device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
 - 1. Dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - a. Enclosure types and details for types other than NEMA 250, Type 1.
 - b. current, and voltage ratings.
 - c. Short-circuit current rating of panelboards and overcurrent protective devices.
 - d. UL listing for series rating of installed devices.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- C. Manufacturer Seismic Qualification Certification: Submit certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Electrical Supports and Seismic Restraints." Include the following:
 - 1. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

- D. Panelboard Schedules: For installation in panelboards, typed.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of panelboards and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70-2008.

1.5 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, and encumbrances to workspace clearance requirements.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Keys: Six spares for each type of panelboard cabinet lock.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers or equal:
 - 1. Panelboards, Overcurrent Protective Devices, and Accessories:
 - a. Eaton Corporation; Cutler-Hammer Products.
 - b. General Electric Co.; Electrical Distribution & Protection Div.
 - c. Siemens Energy & Automation, Inc.

d. Square D.

2.2 MANUFACTURED UNITS

- A. Enclosures: Surface-mounted cabinets. NEMA PB 1, Type 1.
 - 1. Rated for environmental conditions at installed location.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
 - 4. Finish: Manufacturer's standard enamel finish over corrosion-resistant treatment or primer coat.
 - 5. Directory Card: With transparent protective cover, mounted in metal frame, inside panelboard door.
- B. Phase and Ground Buses:
 - 1. Material: Tin-plated Copper.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
- C. Conductor Connectors: Suitable for use with conductor material.
 - 1. Main and Neutral Lugs: Mechanical type.
 - 2. Ground Lugs and Bus Configured Terminators: Mechanical type.
- D. Service Equipment Label: UL labeled for use as service equipment for panelboards with main service disconnect switches. Provide ground fault interrupting rating on panels as indicated.
- E. Future Devices: Mounting brackets, bus connections, and necessary appurtenances required for future installation of devices.

2.3 PANELBOARD SHORT-CIRCUIT RATING

- A. UL label indicating series-connected rating with integral or remote upstream overcurrent protective devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.

2.4 DISTRIBUTION PANELBOARDS

- A. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- B. Main Overcurrent Protective Devices: Circuit breaker.
- C. Branch Overcurrent Protective Devices:

1. Bolt-on circuit breakers.

2.5 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.6 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: UL 489, with series-connected rating to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. GFCI Circuit Breakers: Single-pole configurations with 30-mA trip sensitivity.
- B. Molded-Case Circuit-Breaker Features and Accessories: Standard frame sizes, trip ratings, and number of poles.
 1. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Comply with mounting and anchoring requirements specified in Division 26 Section "Electrical Supports and Seismic Restraints."
- C. Mount top of trim 74 inches (1880 mm) above finished floor, unless otherwise indicated.
- D. Mount plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish.
- E. Install overcurrent protective devices and controllers.
- F. Install filler plates in unused spaces.

- G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
- H. Provide an electrician to open panels for substantial completion observation by Engineer.

3.2 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Electrical Identification."
- B. Create a directory to indicate installed circuit loads. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with engraved metal or laminated-plastic nameplate mounted with corrosion-resistant screws.

3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.4 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.

1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70-2008.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).

2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
5. Or equal manufacturer.

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 5351 (single), 5352 (duplex).
 - b. Hubbell; HBL5351 (single), CR5352 (duplex).
 - c. Leviton; 5891 (single), 5352 (duplex).
 - d. Pass & Seymour; 5381 (single), 5352 (duplex).
 - e. Or equal devices.

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; GF20.
 - b. Hubbell; GF5262.
 - c. Leviton; 6899.
 - d. Pass & Seymour; 2084.
 - e. Or equal device.

2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
 - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).

- e. Or equal devices.

2.5 FLUORESCENT DIMMERS

- A. Provide architectural slide type dimmers (Lutron Nova-T Series or approved equal).

2.6 WALL PLATES

- A. Single and combination types to match corresponding wiring devices. Provide jumbo size plates.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material : Smooth, stainless steel, confirm with Architect..
 - 3. Material for Damp Locations: Metallic with spring-loaded lift, "in use" type cover, and listed and labeled for use in wet locations. Cover shall be capable of being locked with padlock.

2.7 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect, unless otherwise indicated or required by NFPA 70-2008 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70-2008, Article 300, without pigtails.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
7. All switches shall be ADA-compliant, not exceeding 48" aff mounting height to toggle.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on bottom. Group adjacent switches under single, multigang wall plates.

3.2 FIELD QUALITY CONTROL

A. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
3. The tests shall be diagnostic, indicating damaged conductors, poor connections, inadequate fault current path, defective devices, or similar problems. Correct

circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 262726

SECTION 262813 - FUSES

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. Fuses.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from one source and by a single manufacturer.
- B. Comply with NFPA 70-2008 for components and installation.
- C. Listing and Labeling: Provide fuses specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Spare Fuses: Furnish quantity equal to 20 percent of each fuse type and size installed, but not less than 1 set of 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide fuses by one of the following manufacturers or equal:
 - 1. Cooper Industries, Inc.; Bussmann Div.
 - 2. General Electric Co.; Wiring Devices Div.
 - 3. Gould Shawmut.

4. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class as specified or indicated; current rating as indicated; voltage rating consistent with circuit voltage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions to verify proper fuse locations, sizes, and characteristics.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Motor Branch Circuits: Class RK1, time delay.
- B. Other Branch Circuits: Class RK5, non-time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices as indicated. Arrange fuses so fuse ratings are readable without removing fuse.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
 - 1. Fusible switches.
 - 2. Nonfusible switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. GD: General duty.
- B. HD: Heavy duty.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2008, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70-2008
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

1.6 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Manufacturers, provide products by one of the following manufacturers or equal:
 - 1. Eaton Corporation; Cutler-Hammer Products.
 - 2. General Electric Co.; Electrical Distribution & Control Division.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D/Groupe Schneider.
- B. Fusible Switch, NEMA KS 1, Type GD (240V) with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two padlocks, and door interlocked with cover in closed position.
- C. Nonfusible Switch: NEMA KS 1, Type, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

2.2 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Kitchen Locations: NEMA 250, Type 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated.
- C. Coordinate locations of kitchen disconnect switches with equipment supplier before rough-in to avoid conflicts with equipment and table configuration.
- D. Comply with mounting and anchoring requirements specified in Division 16 Section "Electrical Supports and Seismic Restraints."
- E. Where disconnect switches are indicated to be provided with Division 23 equipment, Division 26 Contractor shall install (if not integral with equipment) and connect switches as required. Coordinate all connections to switches with Division 23.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Electrical Identification."
- B. Enclosure Nameplates: Label each enclosure with engraved laminated-plastic nameplate as specified in Division 26 Section "Electrical Identification."

3.4 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
 - 1. Inspect mechanical and electrical connections.
 - 2. Verify switch and labeling.
 - 3. Verify rating of installed fuses.
 - 4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.

3.5 CLEANING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION 262816

SECTION 264313 - SURGE PROTECTIVE DEVICES

(formerly TRANSIENT VOLTAGE SUPPRESSION)

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 describes the materials and installation requirements for Surge Protective Devices (SPDs), formerly TVSS, for the protection of AC electrical circuits.

1.3 STANDARDS

- A. Underwriters Laboratories: UL 1449 and UL 1283.
- B. ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002.
- C. National Electrical Code: Article 285.
- D. NEMA LS-1.

1.4 LISTING REQUIREMENTS

- A. The SPD industry recently revised UL 1449 Third Edition, 2008 NEC Article 285, NEMA LS-1 and various other surge standards. UL 1449 Third Edition, effective 09/2009, includes extensive new indepednet performance testing. This specification centers on UL 1449 Third Edition certification to ensure comparable test evaluations and accessibility of UL's website to verify spec compliance.
- B. SPD shall bear the UL Mark and shall be Listed to most recent editions of UL 1449 and UL 1283. "Manufactured in accordance with" is not equivalent to UL listing and does not meet the intent of this specification.

1.5 SUBMITTAL REQUIREMENTS

- A. Submittals shall include UL 1449 Listing documentation verifying:
 - 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. Type 1 Device Listing

- B. Submittals shall include shop drawings including manufacturer installation instruction manual and line drawings detailing dimensions and weight of enclosure, internal wiring diagram illustrating all modes of protection in each type of SPD required, wiring diagram showing all field connections and manufacturer's recommended wire and breaker sizes.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturer or equal:
1. Current Technology, Inc.
 2. LEA International.
 3. Liebert Corporation; a division of Emerson.
 4. APT (Advanced Protection Technology).

2.2 SURGE PROTECTIVE DEVICES (SPDs)

- A. SPD shall be UL 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.
- B. SPD shall be UL labeled as Type 1 (verifiable at UL.com), intended for use without need for external or supplemental overcurrent controls. Every compression component of every mode, including N-G, shall be protected by internal overcurrent and thermal overtemperature controls.
- C. SPD shall be UL labeled with 20kA nominal (L-N) (verifiable at UL.com) for compliance to UL 96A Lightning Protection Master Label and NFPA 780.
- D. Minimum surge current capability (single pulse rated) per phase shall be 100kA.
- E. SPD shall provide surge current paths for all modes of protection: L-N, L-G, and N-G for Wye systems.
- F. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>System Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>L-L</u>	<u>N-G</u>
208Y/120	800V	800V	12000V	800V

G. UL 1449 Listed Maximum Continuous Operating Voltage (MCOV):

<u>System Voltage</u>	<u>Allowable System Voltage Fluctuation(%)</u>	<u>MCOV</u>
208Y/120	25%	150V

H. SPD shall include visual LED diagnostics including a minimum of one green LED indicator per phase, and one red service LED. SPD shall include an audible alarm with on/off silence function and diagnostic test function (excluding branch).

PART 3 - EXECUTION

3.1 INSTALLATION OF SURGE PROTECTION DEVICES

- A. At Service Entrance or Transfer Switch, a UL approved disconnect switch shall be provided as a means of servicing disconnect if a 60 amp breaker is not available.
- B. SPD shall be installed per manufacturer’s installation instructions with lead lengths as short (less than 24” and straight as possible. Gently twist conductors together.
- C. The contractor shall rearrange breaker locations to ensure short and straightest possible leads to SPDs.
- D. Before energizing, the contractor shall verify service and separately derived system Neutral-to-Ground bonding jumpers per NEC.

3.2 FIELD QUALITY CONTROL

- A. Testing: Perform the following field tests and inspections and prepare test reports:
 - 1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
- B. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 264313

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Lighting fixtures, lamps, and ballasts (interior and exterior building mounted).
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CRI: Color-rendering index.
- C. CU: Coefficient of utilization.
- D. HID: High-intensity discharge.
- E. LER: Luminaire efficacy rating.
- F. Luminaire: Complete lighting fixture, including ballast housing if provided.
- G. RCR: Room cavity ratio.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Ballast.
 - 4. Energy-efficiency data.
 - 5. Lighting Fixtures.
 - 6. Suspended ceiling components.

- 7. Structural members to which suspension systems for lighting fixtures will be attached.
- B. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- C. Shop Drawings: Custom fixtures shall require submittal of detailed, scaled shop drawings showing lamping, material, and UL certification.
- D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide products listed in Lighting Fixture Schedule on the drawings or prior approved equals.

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Comply with UL 1598.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools.

Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

- F. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.

- G. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless different thickness is indicated.
 - b. UV stabilized.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Electronic Ballasts: Comply with ANSI C82.11; instant-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
 - 1. Sound Rating: A.
 - 2. Total Harmonic Distortion Rating: Less than 20 percent.
 - 3. BF: 0.85 or higher.
 - 4. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C 82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.

2.4 BALLASTS FOR COMPACT FLUORESCENT LAMPS

- A. Description: Electronic programmed rapid-start type, complying with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:
 - 1. Lamp end-of-life detection and shutdown circuit.
 - 2. Automatic lamp starting after lamp replacement.
 - 3. Sound Rating: A.
 - 4. Total Harmonic Distortion Rating: Less than 20 percent.
 - 5. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - 6. Operating Frequency: 20 kHz or higher.
 - 7. Lamp Current Crest Factor: 1.7 or less.
 - 8. BF: 0.95 or higher, unless otherwise indicated.

9. Interference: Comply with 47 CFR, Chapter 1, Part 18, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
10. Ballast Case Temperature: 75 deg C, maximum.

2.5 EMERGENCY FLUORESCENT POWER UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
1. Emergency Connection: Operate 2 fluorescent lamp(s) continuously at an output of 1400 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 2. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - a. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - b. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 3. Battery: Sealed, maintenance-free, nickel-cadmium type.
 4. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

2.6 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
1. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.7 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- B. T8 rapid-start low-mercury lamps, rated 32 W maximum, nominal length of 48 inches (1220 mm), 2800 initial lumens (minimum), CRI 75 (minimum), color temperature as indicated on drawings, and average rated life 20,000 hours, unless otherwise indicated.
- C. Compact Fluorescent Lamps: 4-Pin, low mercury, CRI 80 (minimum), color temperature as indicated on drawings, average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated. All compact fluorescent fixtures shall have lamps installed at factory before shipping.

2.8 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 26 Section "Electrical Supports and Seismic Restraints" for channel- and angle-iron supports and nonmetallic channel and angle supports.
- B. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - 1. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - 2. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

END OF SECTION 265100

SECTION 271000 - COMMUNICATION AND DATA-PROCESSING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes wire, cable, connecting devices, installation, and testing for wiring systems to be used as signal pathways for voice and high-speed data transmission for the University of South Carolina (USC).
- B. Materials and methods shall comply with industry standards as specified in "General Guidelines Communications Infrastructure for USC" dated 12/11. USC University Technology Services (USC-UTS) contact for this project shall be Nolan Westbury, 777-7237 or David Peck 777-8786.
- C. This provision of communication and data processing equipment shall comply with the latest versions of the ANSI/TIA/EIA standards. Installations shall comply with applicable local, state and federal codes and standards.
- D. Manufacturers' directions for the installation and assembly of equipment shall be followed. If any discrepancy exists between a manufacturer's requirements and the ANSI/TIA/EIA standards the ANSI/TIA/EIA standards shall govern.
- E. Communication and data-processing equipment and associated infrastructure is shown on electrical (E) drawings of contract drawings and shall compliment this specification section.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. IDC: Insulation displacement connector.
- C. LAN: Local area network.
- D. PVC: Polyvinyl chloride.
- E. STP: Shielded twisted pair.
- F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: Include data on features, ratings, and performance for each component specified.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article. Provide evidence of applicable registration or certification.
- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Maintenance Data: For products to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is a registered communication distribution designer certified by the Building Industry Consulting Service International.
 - 1. The installer shall verify the requirements of the project including but not limited to the physical layout of the building, raceway installation characteristics, closet design specifications and USC installation practices.
 - 2. The installer shall verify required technical specifications for cable installation, connection and testing.
 - 3. The installer shall verify requirements for infrastructure design and layout.
- B. Tools, equipment and labor
 - 1. The installer shall provide all tools and equipment necessary for successful completion of the work.
 - 2. The installer shall provide all materials and labor required for successful completion of the work.
 - 3. All materials and workmanship shall meet Electronics Industry Association / Telecommunications Industry Association standards.
 - 4. Trained and experienced personnel using proper test equipment shall test, certify and document all installations.
- C. Comply with NFPA 70, 2008 edition.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Applicable Standards
 - 1. Cable Infrastructure
 - a. Horizontal pathway hardware (pull boxes, conduit, cable trays, etc.), size, layout, and installation shall comply with ANSI/TIA/EIA 569-A, Section 4.
 - b. Backbone pathway hardware (pull boxes, conduit, cable trays, etc.), size, layout, and installation, shall comply with ANSI/TIA/EIA 569-A, Section 5.
 - c. Work area pathways, hardware (office furniture.), layout, and installation, shall comply with ANSI/TIA/EIA 569-A, Section 6.

- d. Telecommunications room pathways, hardware (pull boxes, conduit, cable trays, etc.), layout, and installation, shall comply with ANSI/TIA/EIA 569-A, Section 7.
- e. Equipment room pathways, hardware (pull boxes, conduit, cable trays, etc.), layout, and installation, shall comply with ANSI/TIA/EIA 569-A, Section 8.
- f. Entrance facilities pathways, hardware (pull boxes, conduit, cable trays, etc.), layout, and installation, shall comply with ANSI/TIA/EIA 569-A, Section 9.
- g. Provide CAT 6 data cables with green outer jacket color and green colored jacks in ivory colored device plates.

PART 2 - PRODUCTS

2.1 APPROVED PRODUCTS: In order to reduce the number of inventory items maintained at USC and to maintain installation warranties, the following products shall be used for all voice and data infrastructure installations on all University of South Carolina campuses. USC CTS/CIS shall be consulted before purchasing network infrastructure equipment and devices in accordance with USC publication "General Guidelines Communications Infrastructure for University of South Carolina." CTS/CIS can recommend products for network infrastructure equipment and devices that are compatible with the USC network and for which CTS/CIS can provide technical support.

2.2 SYSTEM REQUIREMENTS

- A. General: Coordinate the features of materials and equipment so they form an integrated system. Match components and interconnections for optimum future performance.
- B. Unless noted otherwise on plans, each communication station shall have two Cat. 6 cables with green outer jackets terminated on 2 jacks and faceplate. All horizontal cables shall be terminated on patch panels in the third floor TR of that section (quadrant) of the facility. Cables shall rise in stacked communication on each floor. USC shall provide all fiber cables for this building.
- C. The Contractor shall provide one 200 pair copper cable into main basement communication room and copper riser cables terminated on 110 blocks. Selected outlets for life safety systems (i.e. fire alarm, elevator cabs, etc.) shall have copper cable for entire run.

2.3 MOUNTING ELEMENTS

- A. Cable Trays: Comply with Division 26 Section "Cable Trays." Cable trays shall be provided by Division 26 Contractor.
- B. Raceways and Boxes: Comply with Division 26 Section "Raceways and Boxes." Raceways and Boxes shall be provided by Division 26 Contractor.

- C. Equipment Backboards: 3/4-inch (19-mm) interior-grade, fire-resistive-treated plywood painted with two coats of light gray colored fire retardant paint on all sides and edges of the plywood. Cover all walls of data rooms with this plywood. Backboards and grounding bars shall be provided by Division 26 Contractor.
- D. Equipment Rack(s): Panduit CMR19X84.
- E. Vertical Cable Management: Panduit PRV8 and PRVF6.

2.4 COPPER CABLES AND TERMINATIONS

- A. Cable, UTP Copper:
 - 1. Horizontal (Station) Cable: Green, 4-pair, Category 6, plenum rated:
 - a. Berk-Tek 2000.
 - b. CommScope 7504.
 - c. General Genspeed 6500.
 - d. Mohawk Giga Lan.
 - e. Panduit 6500.
- B. Cable, Outside Plant (OSP) Copper:
 - 1. PIC Air Core, Solid Polyolefin Air Core Insulated Conductors, 24 AWG, PE89 Sheath.
- C. Entrance Cable: Panduit P110KB1005Y.
- D. Riser Cable: Panduit P110KB1004Y.
- E. Horizontal (Station) Terminations, Copper:
 - 1. Station Jacks: green, category 6, Pin/Pair Assignment: T568B, Panduit CJ688TGGR.
 - 2. Patch Panels: RJ45, Category 6, Pin/Pair Assignment: T568B:
 - a. 24 Port: (minimum): Panduit DPA24688TGY
 - b. 48 Port: (maximum): Panduit DPA48688TGY
- F. Voice Termination:
 - 1. Station Termination Blocks: Category 6, Type 110 – 4 pair, Panduit P110B1005R2Y.
 - 2. Entrance Riser Cross Connect Termination Blocks: Type 110, 5 pair, Category 6, Hubbell part number
 - 3. Entrance, Building Protector Blocks: Building Entrance Type 100 Pair Block Arresters.
- G. Entrance Protector – Avaya, 489ACA1-025, populated with solid state fuses (Avaya 3C1S).
- H. Patch Cords – Cat 6-A, Panduit UTPSP(length)GR. Lengths in feet 5, 7, 10, 14, and 20. Conventional phone patch cord, Siemon S110P1-U4-(length).

- I. Pathways – comply with ANSI TIA/EIA 569-A, “ Commercial Buildings Standards for Telecommunications Pathways and Spaces”, including addendums 1-4.
- J. Labeling – Cable labeling shall conform to TIA 606, the Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
 1. Hand written labels are not acceptable, only machine generated labels. The label font shall be Times New Roman, Arial, or Courier, and a minimum of 8 point font size.
 2. Labeling for all infrastructure elements shall be consistent and be placed so that it is easily located. Do not place labels on removable covers or doors where they may become lost.
 3. Based on the method of attachment, labels shall be divided into the following categories:
 - a. Adhesive labels shall comply with UL 969 to bond to the element that it identifies and remain legible.
 - b. Adhesive label printing shall be protected from the environment.
 - c. Cable labels shall be able to wrap around the cable.
 - d. Cable labels shall be durable to withstand normal handling and to stay connected to the cable and to remain legible.
 - e. Insert labels shall be durable to withstand normal handling and remain legible.
 - f. Insert labels shall stay securely attached to the element that they identify under the normal operating conditions and usage.
 - g. Other labels shall be durable to withstand normal handling and to remain legible.
 - h. Other labels shall stay securely attached to the element that they identify under the normal operating conditions and usage.
 4. Station Cables:
 - a. Each cable outlet on the wall jack shall be labeled with a unique identifier.
 - b. The voice jack identifier shall be composed of the telecommunications room number and the identifying letter of the 110 block where the cable is terminated.
 - c. The data jack identifier shall be composed of the telecommunications room number, patch panel letter and the patch panel port number where the cable is terminated.
 - i. The faceplate of a jack terminated in telecommunications room 313, on patch panel B, port number 29 would be labeled 313-B-29. This allows the technician to look at a faceplate and know where the other end of the jack cable is terminated.
 5. Patch Panel and 110 wiring block
 - a. Patch Panels shall be uniquely (unique within each closet) labeled with an alpha character starting with the letter "A". Each port on the patch panel shall be labeled with the room number where the opposite end of the cable is terminated.
 - b. Wiring blocks shall be uniquely (unique within each closet) labeled with an alpha character starting with the letter "A" and each four pair section of the block shall be labeled with the room number where the opposite end of the cable is terminated. The room number identifier shall be composed of two parts; the actual room number a dash and a two digit number (starting with 01) for each voice jack in the room.

- c. For 110 Wiring blocks and riser/entrance cables, the beginning and ending pair count for each row shall be printed on the 110 label. For example, the 110 block labels for the second 100 pair riser cable would look like:

101	125
-----	-----

126	150
-----	-----

151	175
-----	-----

176	200
-----	-----

6. Feeder Cable Numbering

- a. Use the building numbers of individual buildings on the feeder cable connects, listing the smaller building number first. The building numbers shall be separated by a dash.
- b. Under the building numbers write the number of pairs the cable contains.
- c. Example: 100 pair feeder cable from building 147 to building 145:
 145-147
 100pr
- d. If more than one feeder cable runs between the same buildings add a cable sequence number to the label.
- e. Example: 100 pair and 200 pair feeder cables from building 145 shall be:
 CA#1 145-147 CA#2 145-147
 100pr 100pr
- f. The labels shall be attached to the cable with tie wraps.
- g. Cable shall be labeled at each end and at intermediate locations.
- h. Inside a building, labels shall be attached at each end and every 50'.
- i. Labels shall be provided within 10' of an entrance or exit to/from a building.
- j. If a feeder cable is spliced the splice case shall be labeled with one of the feeder cable labels. Label numbers shall not change if the cable is spliced.
- k. Each protector shall be labeled with the cable number and the pairs that the protection covers.

K. Faceplate Outlets and Adapters – unless otherwise noted all wall outlets for category 6 copper cable shall include the following:

- 1. Panduit Green CJ688TGGR, Cat 6.
- 2. Insert connections:
 - a. T568-B pin pair assignment for all cables
 - b. Punch down all four cable pairs, do not split pairs between two jacks
 - c. Install all jack inserts with the latching slot down
- 3. Color for inserts:

- a. Green.
 - b. Voice (copper only) – white.
4. Outlet boxes shall be 4" square, 2" deep with single gang plaster ring, minimum. Stations that have cable TV in the same box shall have an additional 1 ½" extension. Extend 1" conduit from outlet box to cable tray in corridor.
 5. Faceplates – Panduit CFPSL(no. of ports)IV:
 - a. Provide place for labeling each jack outlet module with an identification code.
 - b. Provide blank module inserts for all unused module locations.

2.5 CATV CABLES

- A. Provide RG-6/U quad shielded, plenum rated coaxial cable from all CATV locations back to the nearest data room on that respective floor. Cable shall be Belden with quad shielding or approved equal. Provide CATV jacks in device plate. Provide 10 feet of cable slack in data room at equipment board.

2.6 FIBER-OPTIC CABLES, CONNECTORS, AND TERMINAL EQUIPMENT

- A. USC will purchase and install all fiber cables. Division 26 Contractor shall provide sleeves and conduits with pull strings as shown on drawings for fiber cable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine pathway elements intended for cable. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. The installer shall inspect all work to confirm that industry standards have been met. CIS shall have access to any site during installation. Observation of work by CIS does not absolve the installer of any responsibility for inspection.
- B. On an on-going basis the installer shall confirm:
 1. Installation documentation is up to date.
 2. Cables are properly labeled from end to end.
 3. Faceplates are labeled as to use (voice/ data / video).
 4. Terminated cabling is properly tested and documentation of testing is maintained.
 5. Cables installed are appropriate for the pathway (plenum or non-plenum).
 6. Cables are bundled with ties.
 7. Single cables are installed to follow existing bundles.
 8. Pathway is installed per manufacturer's guidelines.

9. Wall penetrations are done properly and fire stopped per code.
 10. Bend radii comply with TIA/EIA standards.
 11. Service loops are in figure 8 configuration.
 12. Potential EMI and RFI sources are considered.
 13. Hanging supports for ceiling installations are spaced properly.
 14. Sag is provided in hanging cable for thermal expansion and contraction.
- C. Patch and modular panel installation requirements have been followed including:
1. Cable management hardware used for dressing cables.
 2. Cable jacket removal for termination 3 to 6 inches maximum.
 3. Pairs terminated in correct order (T568A for data and T568B for voice and special service.)
 4. Pair terminations are made with proper tool so they are snug with minimal pair distortion.
 5. Twists are maintained to index strip (1/2 inch of any pair allowed to be untwisted.)
 6. Cables are bundled with Velcro style cable ties.
 7. Single cables are installed to follow existing bundles.
 8. Pathway is installed per manufacturer's guidelines.
 9. Wall penetrations are done properly and fire stopped per code.
 10. Bend radii comply with TIA/EIA standards.
 11. Service loops are in figure 8 configuration.
 12. Potential EMI and RFI sources are considered.
 13. Hanging supports for ceiling installations are spaced properly.
 14. Sag is provided in hanging cable for thermal expansion and contraction.
- D. Horizontal: The horizontal data cable system provides connections from the horizontal cross-connect to the outlets in the work areas. It consists of UTP category 6 cable, and associated connecting hardware. Cables shall be pull-through (horizontal cable terminated in a telecommunications room on another floor) to 3rd floor data rooms and in compliance with TIA/EIA TSB-72. Horizontal cable systems shall be installed in compliance with the following sections of TIA/EIA 568-A, "Commercial Building Telecommunications Cabling Standard".
1. Section 4, "Horizontal Cabling"
 2. Section 10.2, "Horizontal UTP Cabling"
 3. Unless noted otherwise horizontal data cabling used for each work station shall be plenum rated 4 pair UTP category 6. The color of the cable shall be green.
 4. 4 pair UTP cables shall be provided using a star topology format from the telecommunications room on each floor, following building lines, to each workstation outlet. Exceptions shall require USC planning department approval.
 5. The length of each individual run of horizontal cable from the telecommunications room to the workstation outlet shall not exceed 90m (295') including cable slack (10 foot service loops). Do not make a circular coil with data cables in equipment rooms.
 6. At station outlets, provide 10 inches of slack. The slack is to be in the ceiling above the outlet not in the outlet box. Do not tie wrap the slack above the ceiling, it needs to pull easy if the cable requires re-terminating.
 7. Bend Radii and Pulling Tension: Cable shall not be bent tighter than 4 times the cable diameter. Do not exert a pulling force in excess of 25 pounds. (TIA/EIA 56-A Section 10.6.3.2).

8. Joints and Splices: Each run of cable between the termination block and the workstation outlet shall be continuous without any joints or splices.
 9. Suspended Ceiling: In suspended ceiling areas where cable trays or conduit are not available, the installer shall (with engineer's approval):
 - a. Loosely bundle cables with Velcro or plastic ties at appropriate distances.
 - b. Support cable or bundles with cable hangers spaced at appropriate distances along the pathway.
 - c. Use plenum cable.
 10. Walls: cable shall be installed in raceway concealed in walls.
 11. Conduit:
 - a. Do not over fill the conduit (use TIA/EIA 569-A, Section 6.3.3.2 Pathway fill factor or TIA/EIA 569-A, Annex C, Table C.5-1).
 - b. Conduit shall not have more than two 90 degree bends between pull points or pull boxes.
 - c. For conduit 2" and smaller the recommended 90 degree bend radius is six times the internal diameter.
 - d. For conduit larger than 2" the recommended 90 degree bend radius is ten times the internal diameter.
 - e. Conduit runs shall contain no continuous sections longer than 100'.
 - f. Conduit runs shall contain no 90 degree condulets, also know as "LB's."
- E. Backbone: Backbone systems shall be installed in compliance with the following sections of TIA/EIA 568-A, "Commercial Building Telecommunications Cabling Standard."
1. Section 5, "Backbone Cabling."
 2. Section 10.3, "Backbone UTP Cabling."
 3. Cables shall be supported off the ceiling grid with supports/pathways/conduit and terminated to a rack mounted 110 block at each end using Panduit P110B1005R2Y.
- F. Penetrations:
1. Installer shall provide proper sealant in all conduits, building entrances, and handholes, to seal and block water and dirt seepage.
 2. Installer shall provide fire-stop and sleeves for firewall penetrations as required by NEC and in accordance with ANSI/TIA/EIA-569, Annex A (normative) Fire-stopping.
 3. Installer shall seal all unused openings created for the project.
 4. Provide sealing material and application of sealing material to comply with local fire and building authorities requirements.
 5. Provide reusable fire stop bags for cable tray penetrations.
- G. Voice UTP Termination
1. Voice UTP cable terminations shall comply with ANSI/TIA/EIA-586-A Section 10.4 and shall be labeled in accordance with ANSI/TIA/EIA-606.
 2. Terminate the communications closet end of horizontal 4 pair voice cables on 110 type, four pair wiring blocks. Cables shall be supported off the ceiling grid with supports/pathways/conduit and terminated to a rack mounted 110 block at each end using Panduit P110B1005R2Y.
 3. Terminate the station end with station jack inserts using the T568-B pin-pair assignment.

4. Entrance and riser cable shall terminate on 110 type, five pair blocks on both ends.
 5. Analog Voice Cross-connects shall be yellow blue, two strand.
 6. Digital Voice Cross-connects shall be blue orange, two or four strands as applicable.
 7. All 110 block cross-connect cables shall be made from a single pair or double pair, unshielded unjacketed cable. No other type of jumper or patch shall be used.
 8. Cross-connect cables shall be routed with the wire management fields. Do not route cables in front of any block or label field.
 9. Cross-connects shall not be wrapped around management guides.
 10. Cross-connects shall be installed with enough slack so that a finger-sized loop can be made in the cable at each end when installed.
 11. All terminations shall be made with a cable terminal impact tool.
 12. When disconnecting a cross-connect the entire cable shall be removed. It shall not be left connected at one end.
- H. Data UTP Termination
1. Data cable installations shall be terminated on category 6 patch panels in the communications closet.
 2. Data UTP terminations shall comply with ANSI/TIA/EIA-568-A Section 10.4 and shall be labeled per the ANSI/TIA/EIA-606 standard.
 3. Horizontal 4 pair UTP data cables shall terminate the communications closet end on 24 or 48 port, 19" rack mounted, category 5E T568-A modular patch panel.
 4. Terminate the station end with station jack inserts using the T568-A pin-pair assignment.
 5. Entrance and riser UTP cable shall terminate on 24 or 48 port, 19" rack mounted category 5E, T568-A modular patch panel.
- I. Wire Management: Provide sufficient horizontal and vertical wire management so that patch cord can be routed orderly between patch panels and network equipment. Where all switch ports connect to a single patch panel, mount the switch directly below the patch panel and connect with twelve inch patch cords.
- J. Install cable without damaging conductors, shield, or jacket.
- K. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
1. Pull cables simultaneously if more than one is being installed in the same raceway.
 2. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage media or raceway.

3.3 GROUNDING

- A. Comply with Division 26 Section "Grounding." Division 26 Contractor shall provide ground bar in each data room.

- B. All grounding and bonding shall be installed in accordance with ANSI/TIA/EIA-607, "Commercial Building Grounding and Bonding Requirements for Telecommunications."
- C. Grounding connections shall be provided for all equipment.
- D. Bond shields and drain conductors to ground at only one point in each circuit.

3.4 INSTALLATION IN EQUIPMENT ROOMS AND WIRING CLOSETS

- A. Equipment rooms, telecommunications rooms and entrance facilities shall be provided per ANSI/TIA/EIA-586-A, Sections 7,8,9 and ANSI/TIA/EIA-569-A, Section 7,8,9.
- B. Division 26 Contractor shall line walls with ¾" grade A plywood backboards, floor to 8' AFF. Paint backboards with light colored fire retardant paint, two coats on all sides, including edges.
 - 1. Provide a sufficient number of four or eight inch "D" rings to dress cable to the plywood backboard. Cables shall be threaded through all "D" rings in their path across the plywood backboard.
- C. Group connecting hardware for cables into separate logical fields.
- D. All communications equipment installed in equipment rooms, telecommunications rooms and entrance facilities shall be placed in a rack, on a shelf, or attached to a plywood backboard with a hinged wall bracket.
 - 1. Floor mounted racks: Racks shall be standard 19" wide and 84" in height. Racks shall be bolted to the floor or secured in a manner that prevents tipping. There shall be easy access to the front and back of equipment installed in each rack. Provide a 12" ladder rack above the equipment rack. Secure the ladder rack to the room walls. The ladder rack shall be used for cable management. There shall be 3 feet of clearance in front, rear, and one side of rack.
 - 2. Wall mount racks: Wall mounted racks shall be standard 19" width by 18" depth and shall be hinged for easy access to the communications equipment mounted on that rack.
 - 3. Cable Management: Cable shall approach the rack from above via ladder rack or conduit. Alternatively cable shall approach the rack from directly below if on a raised floor system. Cable shall not be routed along the floor or across a work space in the closet.
 - 4. Shelving: Shelves shall be large enough to completely support equipment and allow equipment to be turned for cable access to the rear of the equipment. Shelves shall be secured from structure and shall be capable of carrying the weight of the load on them without integral distortion.
- E. Provide one 4" trade size sleeves per single line diagram on drawings. Conduits and cable channels in communications closets shall be per ANSI/TIA/EIA-569-A, Commercial Building Standard for Telecommunications Pathways and Spaces.
 - 1. Provide a mule tape or pull cord in all empty pathways.
- F. Provide a voice station for telephone service in the telecommunications room. The jack shall be wall mounted near the entrance door.

3.5 FIELD QUALITY CONTROL

- A. Testing: On installation of cable and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
 - 1. Copper Cable Procedures:
 - a. Data: Each data cable "Permanent Link" (station jack to patch panel jack connection) shall pass the following Category 6 field test per ANSI/TIA/EIA-568-B1-B3 with addenda, TIA/EIA TSB-67 AND TIA/EIA TSB-95. Printed test results shall be provided to CIS project planner.
 - i. Wire map.
 - ii. Length.
 - iii. Attenuation
 - iv. Near End Crosstalk Loss (NEXT)
 - v. Equal Level Far-end Crosstalk (ELFEXT)
 - vi. Propagation Delay/Delay Skew
 - vii. Return Loss
 - viii. Power Sum Crosstalk (both NEXT AND ELFEXT)
 - b. Fiber Optic Power Meters shall be used to measure total loss or attenuation. This test shall be conducted on all installed fiber cables.

- B. The installer shall have the installation tested and provide a copy of the test results to USC Computer Services. Before a cable may be connected to the USC network a Computer Services representative shall have the option to perform a final acceptance observation and test to verify that all specified methods and materials have been provided. Computer Services shall be contacted a minimum of one week prior to the anticipated connection date. Provide "as-built" drawings showing jack numbers and room numbers.

- C. REPORTS – Installer shall provide printed documentation. Example:

CABLE ID	PATHWAY	TERM POS.1	SPACE 1	CABLE TYPE	APP
		TERM POS.2	SPACE 2	CABLE LENGTH	EQUIP
C0001	CD34	J0001	D36	CATEGORY 6	TR3
		3A-C17-001	3A	165 FT	
CD02	SL02-05	C4R6-001	B101	100 PR CMR	VOICE
		3A-A17-001	3A	75 FT	PBX

- D. Correct malfunctioning units at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

3.6 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION 271000

SECTION 283100 - FIRE ALARM SYSTEM

PART 1 - GENERAL

SUMMARY

This Section includes fire alarm systems and requirements for system components including the following:

- Manual pull stations.
- Stopper protective covers (SPC's) for manual pull stations.
- Spot-Type smoke detectors.
- Spot-Type heat detectors.
- Duct type smoke detector.
- Addressable interface units (AIU's).
- Alarm indicating devices.
- Fire Alarm Control Panel (FACP).
- Transient voltage surge suppression (TVSS).
- Emergency power supply.
- Digital alarm communicator transmitter (DACT).
- RJ-31X phone jacks.
- Instructions.
- Tags.

DEFINITIONS

Active Multiplex System: A multiplexing system in which signaling devices are employed to transmit and receive status signals of each initiating device and/or initiating device circuit within a prescribed time interval so that lack of receipt of such signal may be interpreted as a trouble signal.

A.D.A.: Americans with Disabilities Act Guidelines.

Alarm Initiating Devices: Manual and automatic detection devices such as manual pull stations, heat detectors, and smoke detectors.

Alarm Notification Appliances: Devices such as audible-only alarm units (speakers), visible-only alarm units (strobes), and combination audible/visible alarm units.

Alarm Signal: Signifies a state of emergency requiring immediate action. Pertains to signals caused by the operation of alarm initiating devices.

Analog Smoke Detector: A smoke detector that transmits a signal indicating varying degrees of smoke density and includes a warning system to indicate when the detector is dirty and when the detector drifts outside of its listed sensitivity range. Detectors shall include an adjustable sensitivity feature capable of being manipulated at the fire alarm control panel.

Class B Wiring: Wiring method used to interface non-addressable detection devices to addressable interface units (AIU's) and for notification appliance circuits. Class B circuits shall be electrically supervised such that a single break or a single ground fault condition will be indicated by a trouble signal at the FACP and remote annunciator panel no matter where the break or ground fault condition occurs.

Notification Appliance Circuit (NAC): Circuit for connection of notification appliances. Circuits shall be electrically supervised such that a single break or a single ground fault condition will be indicated by a trouble signal at the FACP and remote annunciator panel no matter where the break or ground fault condition occurs.

Signaling Line Circuit (SLC): Multiplex circuit for connection of alarm initiating devices. Circuits shall be electrically supervised such that a single break or a single ground fault condition will be indicated by a trouble signal at the FACP and remote annunciator panel no matter where the break or ground fault condition occurs.

Supervisory Signal: Indicates need for action regarding maintenance of the fire detection and alarm system.

Trouble Signal: Indicates that a fault, such as an open circuit or ground, has occurred in the system.

Zone: Designation for an initiating device having a unique identity (for means of annunciation, status, and/or control) on a signaling line circuit.

SYSTEM DESCRIPTION

General: Active multiplex, addressable, microprocessor based type system with both manual and automatic alarm initiation, and both audible and visible evacuation alarms. Subpanels and/or power supply units located remotely from the fire alarm control panel shall not be provided.

Signal Transmission: Multiplex signal transmission dedicated to fire alarm service only.

Audible Alarm Indication: By system speakers arranged to provide a **synchronized** three-pulse temporal pattern in accordance with NFPA 72 and ANSI S3.41. **Speakers shall also be set up to broadcast Mass Notification announcements (strobe light units shall not flash when announcements are broadcast).**

Visible Alarm Indication: By **synchronized** strobe light units that comply with NFPA 72 and A.D.A. guidelines.

System connections for alarm initiating devices: Devices shall be connected using signaling line circuits (multiplex addressable type).

System connections for alarm notification appliances: Devices shall be connected using Class B notification appliance circuits.

Functional Description: Provide a complete fire detection and alarm system with the following functions and operating features:

Priority of Signals: Automatic response functions shall be accomplished by the first zone/device initiated. Alarm functions resulting from initiation by the first zone/device shall not be altered by subsequent alarms. An alarm signal shall be the highest priority. Supervisory or trouble signals shall have second- and third-level priority. Signals of a higher level priority shall take precedence over signals of lower priority even though the lower priority condition occurred first. Annunciate all alarm signals regardless of priority or order received.

Noninterfering: Provide zoned, powered, wired, and supervised system so that a signal from one zone/device does not prevent the receipt of signals from any other zone/device. All zones/devices shall be manually resettable from the FACP after the initiating device or devices have been restored to normal. Systems that require the use of batteries or battery backup for the programming function are not acceptable and shall not be provided.

Air Handling Unit Shutdown: Automatic shutdown of an existing air handling unit (that currently has one duct smoke detector) shall occur when its detector goes into alarm and when a general alarm occurs at the FACP. **Wiring shall be provided such that the air handling unit shall automatically restart when the fire alarm system is reset to a normal condition.**

Transmission to a Remote Central Station: Alarm signals shall be automatically routed to USC's Police Station in Columbia, South Carolina via a DACT provided integral to the FACP cabinet.

Function Switches at the FACP: Switches shall provide capability for Alarm Acknowledgement, Supervisory Acknowledgement, Trouble Acknowledgement, Alarm Silence, System Reset, and AHU Shutdown.

Alarm Acknowledgement: Under normal conditions each panel shall display a "SYSTEM NORMAL" message. Should an abnormal condition be detected an appropriate LED (Alarm, Supervisory, or Trouble) shall flash and an audible signal shall be activated at the panel. The panel shall display the following information relative to the abnormal condition of a point in the system:

1. Custom alarm point label (40 characters minimum)
2. Type of device (e.g., smoke detector, heat detector, manual pull station, etc.)
3. Point status (e.g., alarm, supervisory, trouble)

Pressing the appropriate acknowledge button shall acknowledge the alarm, supervisory, or trouble condition. After all the points have been acknowledged, the LED's shall glow steady and the panel's audible signal shall be silenced.

Alarm Silencing: Should the "Alarm Silence" button be pressed, all building and panel audible alarm signals shall cease operation. **All building visible alarm signals shall continue operation.**

System Reset: The "System Reset" button shall return the system to its normal state after an alarm condition has been remedied. Should an alarm condition continue to exist, the system shall remain in an abnormal state. System control relays shall not reset. The panel's audible signal and the Alarm LED shall be on. The display shall indicate the total number of alarms and troubles present in the system along with a prompting to review the points. These points shall not require acknowledgement if they were previously acknowledged.

Power Loss Indication: Sound trouble signal at the FACP upon loss of primary power at the FACP. Provide an indication at the FACP when the system is operating on an alternate power supply.

Remote Detector Status Indication:

Tamper: Status annunciation of individual smoke and heat detectors at the FACP to indicate when a detector has been removed from its base.

Maintenance: Status annunciation of individual analog smoke detectors at the FACP to indicate when a detector is dirty and requires cleaning or when it has drifted outside of its listed sensitivity range.

Remote Detector Sensitivity Adjustment: Manipulation of controls at the FACP shall allow the selection of specific smoke and heat detectors for adjustment, display their current status and sensitivity settings, and control changes in those settings. Provide ability of using the same controls to program repetitive scheduled changes in sensitivity of specific detectors. These adjustments shall be capable of being made by the Owner's maintenance personnel and shall not require the use of additional and/or proprietary programming equipment.

Annunciation: Annunciate manual or automatic operation of any alarm or supervisory initiating device on the FACP indicating the location and type device as indicated herein.

Annunciator Display: 80 character (minimum) alphanumeric, liquid-crystal-display (LCD) type.

Signal Initiation: The manual or automatic operation of an alarm initiating or supervisory operating device shall cause the FACP to transmit an appropriate signal including:

General Alarm: A system general alarm includes:

Indicating the general alarm condition at the FACP.

Identifying the device that is the source of the alarm at the FACP.

Initiating audible and visual alarms throughout the building, including all smoke detector sounder bases.

Automatic shutdown of all existing air handling units and fan coil units which include a duct smoke detector.

Initiating transmission of alarm signal to USC's remote central monitoring station via a digital alarm communicator transmitter.

Trouble Alarm: A system trouble and/or supervisory alarm includes:

Audible indication of the trouble/supervisory condition at the FACP.

Identifying the device that is the source of the trouble condition at the FACP.

Initiating transmission of trouble/supervisory signal to USC's remote central monitoring station via a digital alarm communicator transmitter.

Alarm initiation for installed fire detection devices shall be as follows:

Smoke detector requiring maintenance/cleaning shall initiate a supervisory alarm.

Removal of smoke and/or heat detectors from their mounting bases shall initiate a trouble alarm.

Manual pull station alarm operation shall initiate a general alarm.

Smoke detector alarm operation of single-station type smoke detectors:

Apartment with multiple detectors:

First ten minutes in alarm: Sound detector's internal horn (sounder base), sounds the internal horn of the other smoke detectors common to its apartment unit, activates strobes (where applicable in accessible/handicapped units), and initiates a trouble alarm.

If someone acknowledges the alarm or resets the system at the FACP within the first ten minutes in alarm, the system shall be reset to normal with no further alarm activation.

After first ten minutes in alarm: If no one acknowledges the alarm or resets the system at the FACP within the first ten minutes of alarm, the apartment horns (and strobes, where applicable) shall continue sounding and a general alarm shall be initiated.

Note: If smoke detectors in two or more apartment units are in an alarm state at the same time, a general alarm shall occur immediately, with no delay.

Water flow alarm switch operation initiates a general alarm.

Air pressure alarm switch operation initiates a general alarm.

Low-Air pressure alarm switch operation initiates a supervisory alarm.

Sprinkler valve tamper switch operation initiates a supervisory alarm.

Heat trace controller trouble alarm activation initiates a supervisory alarm.

Independent System Monitoring: Supervise each detection device and each alarm notification device for both normal operation and trouble.

Circuit Supervision: Indicate circuit faults with both a zone and a trouble signal at the FACP. Provide a distinctive indicating audible tone and (LED) indicating light.

The maximum elapsed time between the occurrence of an alarm or a trouble condition and its indication at the FACP shall be 10 seconds.

SUBMITTALS

General: **The Contractor shall not begin the installation of any raceways or boxes for the fire alarm system until shop drawings and product data have been reviewed by the Architect/Engineer.** Provide 3 copies of submittals for the following:

Product data for fire alarm system components including dimensioned plans, sections, and elevations showing minimum clearances, installed features and devices, and list of materials.

Wiring diagrams from manufacturer differentiating between manufacturer-installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified. Include drawings indicating components for both field and factory panel wiring.

Shop drawings from manufacturer indicating all wiring for detection, alarm, and communications circuits. Include equipment types and locations, raceway sizes, number and type of wires/cables, and conductor color coding for each circuit type. Shop drawings shall be provided on 30" x 42" (E-size) prints. Final submittal shall include one set of shop drawings on a reproducible (vellum) media.

Calculations of required battery capacity for both alarm and supervisory modes.

System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs. Description shall cover this specific project. Manufacturer's standard descriptions for generic systems are not acceptable.

Operation and maintenance data: Provide three 3-ring binders for Operating and Maintenance Manuals. Operation and maintenance data shall cover each type of product, including all features and operating sequences, both automatic and manual. In addition, provide the following:

1. Spare parts Data.
2. Names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the systems to be furnished.
3. A listing of the manufacturer's representatives responsible for installation coordination and service.

4. A list of addresses for every device that is provided for purposes of alarm initiation, status monitoring, supervised notification appliance circuits, and auxiliary control.
5. A list of smoke detector sensitivity setpoints for all installed detectors.

Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with the referenced standards.

QUALITY ASSURANCE

Installer Qualifications: Engage an experienced installer who is a factory-authorized service representative and a licensed contractor in the State of South Carolina to perform the Work of this Section.

Compliance With Local Requirements: Comply with the International Building Code (IBC), local ordinances, local regulations, CABO/ANSI A117.1 (A.D.A.), requirements of the USC Fire Marshal, and requirements of the State Engineer.

Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

NFPA Compliance: Provide fire alarm and detection systems conforming to the requirements of the following publications:

NFPA 72, "National Fire Alarm Code."

UL Listing and Labeling: Provide system and components specified in this Section that are listed and labeled by UL.

Single-Source Responsibility: Obtain fire alarm components from a single source who assumes responsibility for compatibility of system components furnished.

MAINTENANCE SERVICE

Maintenance Service Contract: Provide maintenance of the fire alarm system for a period of 12 months commencing with Substantial Completion, using factory-authorized service representatives.

Basic services: Systematic, routine maintenance visits on a monthly basis at times coordinated with the Owner. In addition, respond to service calls within **4 hours** of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.

SPARE PARTS

General: Furnish spare parts matching products installed, as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.

Strobe Units: Furnish one of each candela rating.

Audible-Only Alarm Units: Furnish four.

Combination Audible/Visible Alarm Units: Furnish one of each type and candela rating.

Smoke Detectors: Furnish four.

Heat Detectors: Furnish two.

Detector Bases: Furnish four.

PART 2 - PRODUCTS

MANUFACTURERS

General: Substitutions for manufacturers and systems indicated below must be prior-to-bid approved by the Architect/Engineer. Submit a complete set of cut sheets indicating all equipment and devices to be furnished in order to be considered for prior approval. Additional information deemed necessary by the Architect/Engineer to show a manufacturer's capability in complying with the project requirements shall be provided when requested.

Manufacturers and systems are as follows:

1. Simplex Time Recorder Company.
2. Fire Control Instruments (FCI).
3. Notifier.
4. Or Equal.

MANUAL PULL STATIONS

General: Single-action type, fabricated of metal or plastic, and finished in red with molded raised letter operating instructions of contrasting color. Stations requiring the breaking of a glass panel are not acceptable. Stations that require the breaking of a concealed glass rod may be provided. Provide stations with screw terminals for connections.

Addressability: Provide manual pull stations with a communication transmitter and receiver having a unique identification and status reporting capability to the FACP.

Reset: Key-operated reset station switch, double pole, double throw, and rated for the voltage and current at which they operate.

Cover: Provide an STI #6535 Mini Weather Stopper II (Safety Technology InterNational) cover/housing and an STI #6581 backplate for **all** manual pull stations. **Sign/Message on front of housing shall read, "IN CASE OF FIRE - LIFT COVER AND PULL FIRE ALARM"**. Provide additional STI #6531 spacers and #6501 gaskets as required to accommodate pull station and backbox depth. Note: No internal sounder/horn.

SMOKE DETECTORS

General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Provide the following features:

Factory Nameplate: With serial number and type identification.

Operating Voltage: 24-V d.c., nominal.

Self-Restoring: Provide detectors that do not require resetting or readjustment after actuation to restore them to normal operation.

Plug-in Arrangement: Detector and associated encapsulated electronic components mounted in a module that connects to a fixed base with a twist-locking plug connection. The plug connection shall require no springs for secure mounting and contact maintenance. Provide terminals in the fixed base for building wiring.

Visual Indicator: Connected to indicate detector has operated.

Addressability: Provide detectors with a communication transmitter and receiver having a unique identification and status reporting capability to the FACP.

Spot-Type Smoke Detectors: Include the following features and characteristics:

Sensor: Photoelectric type with infrared detector light source and matching silicon cell receiver.

Detector Sensitivity: Adjustable between 0.6 and 3.5 percent per foot smoke obscuration when tested in accordance with UL 268. Programmed/Installed setpoint for each detector shall be 3.5% per foot.

Remote Controllability: Provide detectors individually monitorable at the FACP for calibration, sensitivity, and alarm condition, and have capability of individually adjusting sensitivity from the FACP.

Sounder Base Type Smoke Detectors: Include the following features and characteristics:

Sensor: Photoelectric type with infrared detector light source and matching silicon cell receiver.

Detector Sensitivity: Adjustable between 0.6 and 3.7 percent per foot smoke obscuration when tested in accordance with UL 268. Programmed/Installed setpoint for each detector shall be 3.7% per foot.

Remote Controllability: Provide detectors individually monitorable at the FACP for calibration, sensitivity, and alarm condition, and have capability of individually adjusting sensitivity from the FACP.

Sounder Base: Base shall have an integral mini-horn rated 85 db at 10 feet minimum. Mini-horn shall be CPU controllable/programmable.

Duct Smoke Detector: Include the following features and characteristics:

Smoke detector with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Complete with detector housing and programmable relay as required for fan shutdown.

Sensor: Photoelectric type with infrared detector light source and matching silicon cell receiver.

Detector Sensitivity: Adjustable between 0.6 and 3.7 percent per foot smoke obscuration when tested in accordance with UL 268. Programmed/Installed setpoint for each detector shall be 3.7% per foot.

Remote Controllability: Provide detectors individually monitorable at the FACP for calibration, sensitivity, and alarm condition, and have capability of individually adjusting sensitivity from the FACP. Detector units shall also shutdown air handling units via manual operation of control switch at the FACP.

Programmable Relay: Each detector shall be provided with an integral programmable control relay that shall be rated to properly interface with the HVAC control system for shutdown functions. Provide an isolation relay of proper ratings if the detector relay ratings do not meet HVAC system control voltage and amperage requirements.

COMBINATION REMOTE INDICATING LIGHT AND TEST STATIONS

General: Provide stations including a location-indicating, system-voltage light and a keyed test switch for remote status and testing of duct smoke detectors. Station components shall be attached to a wallplate for mounting on a single-gang wall box. Provide two keys to the Owner for each unit provided.

HEAT DETECTORS

General: Comply with UL 521. Provide the following features:

Factory Nameplate: With serial number and type identification.

Self-Restoring: Provide detectors that do not require resetting or readjustment after actuation to restore them to normal operation.

Plug-in Arrangement: Detector and associated encapsulated electronic components mounted in a module that connects to a fixed base with a twist-locking plug connection. The plug connection shall require no springs for secure mounting and contact maintenance. Provide terminals in the fixed base for building wiring.

Visual Indicator: Connected to indicate detector has operated.

Addressability: Provide detectors with a communication transmitter and receiver having a unique identification and status reporting capability to the FACP.

Spot Type Heat Detectors - 135 Degree Type: Fixed-temperature and rate-of-rise unit. Fixed-temperature setting shall be 135-deg F.

ADDRESSABLE INTERFACE UNITS (AIU's)

General: Addressable interface units designed to provide either the monitoring of system components not equipped for multiplex communication and/or the actuation of dry contacts based on the operation of other detection components or switches in the fire detection system, as applicable. Provide units with a communication transmitter and receiver complete having a unique identification and status-reporting capability to the FACP.

ISOLATION RELAYS

General: Electrical relay units designed to provide isolation of operating power from switched power for other control systems. Provide units with contact ratings as required for connected loads. Operating voltage shall be 24-V d.c., nominal. Output contacts shall be Form C relay type.

ALARM NOTIFICATION APPLIANCES

General: Equip alarm notification devices for mounting as indicated. Provide terminal blocks for incoming and outgoing system connections.

Visible-Only Alarm Units:

Strobe lights utilizing high-intensity, clear, optic lens and xenon flash tube. Provide luminaires having their lenses mounted on an aluminum faceplate. Provide the word "FIRE" engraved in minimum 1-inch-high letters displayed on the unit. Orient lettering in accordance with mounting of unit (e.g., lettering for ceiling mounted units shall be horizontal across the lens, lettering for wall mounted units shall be vertical down the lens). Strobe leads shall be factory connected to screw terminals. Provide units with lamps having intensities as indicated on the contract drawings (minimum). Where a strobe unit manufacturer does not produce units with strobe intensities that match those indicated on the contract drawings, units with the next higher intensity above the intensity specified shall be provided. **Intensity requirements indicated for each unit shall be met regardless of the viewing angle to the device (e.g., dual rated 15/75 candela strobes shall only be used for 15 candela applications).**

Synchronized Flash: Units (and their associated notification appliance circuits) shall be arranged to provide a synchronized flash sequence for all visible alarm units in the building.

Weatherproof Units: Provide weatherproof housing, components, backboxes, rubber gaskets, and hardware for units indicated to be weatherproof.

Audible-Only Alarm Units: Compression-driver type speakers having a frequency response of 400 to 4,000 Hz for fire alarm horn tone and 125 Hz to 12,000 Hz for voice messages. Speakers shall be equipped with an alnico V magnet and a multiple-tap, varnish impregnated, sealed matching transformer. **Speakers shall be connected for 2 watt tap setting.** Minimum output at 2 watt setting shall be 90 dB per UL 1480. Speakers shall be voltage-matched to the signal control panel amplifier output voltage. Provide speakers capable of generating alarm signals with a sound pressure level of 85 db, measured 10 feet from the source, minimum.

Synchronized Temporal Pattern: Speaker units (and their associated notification appliance circuits) shall be arranged to provide a three-pulse temporal pattern in accordance with NFPA 72 and ANSI S3.41. The temporal pattern shall be synchronized for all audible alarm units in the building.

Combination Audible/Visible Alarm Units: Provide factory-combined audible and visible (speaker and strobe) alarm units in a single mounting unit where indicated.

Weatherproof Units: Provide weatherproof housing, components, backboxes, rubber gaskets, and hardware for units indicated to be weatherproof. Ensure weep holes are oriented down toward the ground when backbox is installed.

FIRE ALARM CONTROL PANEL (FACP)

General: Comply with UL 864, "Control Units for Fire Protective Signaling Systems." **Networked type systems including multiple control panels and/or remote power supplies installed in different locations of buildings shall not be provided.**

Panel Cabinet: Provide two **red colored**, lockable steel cabinets with trim for **flush mounting**. Cabinets shall be of the same dimensions and trim and have matching locks. Arrange cabinets so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosures. Provide cabinets large enough to accommodate all components and to allow ample gutter space for interconnection of components as well as field wiring. Identify each cabinet and each component by an engraved red laminated phenolic resin nameplate. Lettering on the cabinet nameplate shall not be less than 1 inch high.

Systems: Provide for separate and independent alarm and supervisory systems in the FACP. The signaling line circuit loop board(s) in the FACP shall consist of plug-in cards. Construction requiring removal of field wiring for module removal shall not be provided.

Control Modules: Types and capacities to perform all functions of the fire alarm system. Provide local, visible, and audible signals to notify of any alarm, supervisory, and trouble condition. Provide each type of audible alarm with a distinctly different sound.

Zones: Make provision in the FACP for all detection, communications, and supervisory zones required to provide the functions described herein and indicated on the contract drawings.

Notification Appliance Circuits: Separate notification appliance zones and associated circuits shall be provided for audible and visible notification appliances. They shall be arranged such that audible notification appliances can be silenced during a general alarm while the visible notification appliances remain flashing. Make provision in the FACP for all notification appliance

zones and circuits (audible and visible) required to provide the functions described herein and indicated on the contract drawings.

Synchronized Flash: Visible notification appliance circuits (and their associated visible alarm notification appliances) shall be arranged to provide a synchronized flash sequence for all visible alarm notification appliances in each building.

Synchronized Temporal Pattern: Audible notification appliance circuits (and their associated audible notification appliances) shall be arranged to provide a three-pulse temporal pattern in accordance with NFPA 72 and ANSI S3.41. The temporal pattern shall be synchronized for all audible notification appliances in the building.

Voice Alarm: Provide a digital-voice, integrated, UL listed, life safety, and emergency communication system, complying with the requirements of NFPA 72. The FACP shall include central voice alarm system components complete with all necessary microphones, pre-amplifiers, amplifiers, and tone generators. Features shall include:

Amplifiers: Comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Provide amplifier wattage capacity to accommodate all audible notification appliances where each appliance is tapped at 2 watts with 20 percent spare capacity, minimum.

Alarm Channels: Two channels to permit transmission of mass notification voice announcements and temporal-coded evacuation signals to all portions of the building as well as emergency public address announcements via the central control microphone. All announcements shall be made over dedicated, supervised communication lines.

Mass Notification Messages: Coordinate signal input and connectivity requirements with Todd Griffin (USC Fire Marshal).

Alphanumeric Display and System Controls: Arrange to provide the basic interface between the human operator at the FACP and addressable system components, including annunciation, supervision, and control. Provide a display with a minimum of 80 characters, arranged to display alarm, supervisory, and component status messages and indicate control commands to be entered into the system for control of detector sensitivity and other parameters.

Coordination: Provide system programming and coordination as required to establish proper communications and communicate scheduled alarm codes/messages to the central monitoring station equipment.

TRANSIENT VOLTAGE SURGE SUPPRESSION

General: Provide a transient voltage surge suppression (TVSS) device to protect the primary power branch circuit to the FACP. Device shall be specifically designed and UL listed to protect the type of circuit connected thereto. Fuses are not acceptable and shall not be provided.

EMERGENCY POWER SUPPLY

General: Provide an emergency power supply for the FACP. Components shall include batteries, a charger, and an automatic transfer switch. The emergency power system shall be provided integral with the FACP cabinet.

Batteries: Sealed lead-acid type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (nonalarm) mode for a period of **24 hours**. Following this period of operation on battery power, the batteries shall have sufficient capacity to operate all components of the system, including all alarm notification appliances in alarm or supervisory mode for a period of **5 minutes**.

Automatic Transfer Switch: Transfer the load to the battery without loss of signals or status indications in the event of the failure of primary power.

Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Provide for 150 percent of the connected system load while maintaining the batteries at full charge. In the event batteries are fully discharged, the charger shall recharge them fully within twelve hours. Charger output shall be supervised as part of system power supply supervision.

DIGITAL ALARM COMMUNICATOR TRANSMITTER (DACT)

Provide a digital alarm communicator transmitter that is UL listed for commercial fire reporting in accordance with NFPA 72. Unit shall include a two-line Digital Alarm Communication Transmitter (DACT) for communicating with USC Police Station located in Columbia, South Carolina. **The DACT shall be provided integral with the FACP; a separate panel shall not be provided.** The DACT shall be capable of transmitting all data as specified herein.

Communicator Program: The system shall have a dual telephone line transmission feature. The first line shall be capable of dialing 2 telephone numbers, of 15 digits each using the switched telephone network such that if 2 unsuccessful attempts are made to the first number the system shall automatically switch to the second number and make 2 attempts. If these 2 attempts are unsuccessful the system shall switch between numbers after 2 attempts each, until a successful connection is made or a maximum of 10 tries are attempted. Once 10 unsuccessful attempts are made the system shall stop dialing. Should another event occur which requires a message to be transmitted the dialing process shall be repeated. This line shall be supervised. If the first line is tampered-with or cut-off, the second line shall transmit an alarm to the central station.

Automatic Recall Time: The system shall transmit an Automatic Recall Message using the digital alarm communicating transmitter to test communications, each 24 hours.

Communication Failure Alarm: Should the digital alarm communicating transmitter fail to communicate with the central monitoring station receiver on 3 successive attempts, a trouble condition shall be activated in the FACP

Communication Reporting Format: The communicator shall be capable of communicating to USC's central monitoring station using the **Silent Knight 4+2 Extended** format and the **Contact ID** format. Programmed/Installed format for this installation shall be **Contact ID**.

Emergency Power Supply: Emergency power for the DACT unit shall be provided from the FACP emergency power supply system as specified above.

Central Station Coordination: Provide system programming and coordination with USC's Fire Marshal and the monitoring/police station as required to establish proper communications and communicate alarm codes.

RJ-31X TELEPHONE JACKS

General: Provide two RJ-31X telephone jacks for connection of DACT unit to telephone lines. Jacks shall be ADI part #MO-RJ31X or equal.

INSTRUCTIONS

General: Provide **one** of the following:

Provide a typeset, printed, or typewritten instruction card mounted behind a lexan plastic or glass cover in a stainless steel or aluminum frame. Describe steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions: normal, alarm, and trouble.

Obtain approval for instructions before mounting.

Install in a location adjacent to the FACP.

TAGS

Tags For Identifying Tested Components: Comply with NFPA 72.

PART 3 - EXECUTION

INSTALLATION, GENERAL

Install system in accordance with NFPA Standards referenced in Parts 1 and 2 of this Section.

EQUIPMENT INSTALLATION

Backboxes for Fire Alarm System Devices: Install recessed boxes adjacent to existing structural members where possible and fasten boxes to structural members for added support. Provide screw-type "old work" box clips where applicable for recessed boxes. Fasten surface mounted boxes to structural members where possible.

Manual Pull Stations: Mount stations in/on walls as detailed on the contract drawings with top of station at 48 inches above finished floor.

Spot-Type Smoke Detectors: Install detectors indicated to be ceiling mounted not less than 4 inches from a side wall to the near edge. Detectors shall be semi-flush mounted on recessed backboxes unless noted or detailed otherwise. **Backboxes shall be supported independent of acoustical drop ceilings using T-Bar support brackets.** On smooth ceilings, install detectors not over 30 feet apart in any direction. Install detectors located on the wall at least 4 inches but not more than 12 inches below the ceiling. Install detectors no closer than 3 feet from air registers unless prior approved by the Architect/Engineer.

Duct Smoke Detectors: Electrical contractor shall furnish detectors and mechanical contractor shall install them. Mechanical contractor shall provide fan shutdown wiring. Electrical contractor shall connect detectors to FACP.

Spot-Type Heat Detectors: Install detectors indicated to be ceiling mounted not less than 4 inches from a side wall to the near edge. Detectors shall be semi-flush mounted on recessed backboxes unless noted or detailed otherwise. **Backboxes shall be supported independent of acoustical drop ceilings using T-Bar support brackets.** Install detectors located on the wall at least 4 inches but not more than 12 inches below the ceiling. Install detectors no closer than 3 feet from air registers unless prior approved by the Architect/Engineer.

Addressable Interface Units and Isolation Relays: Install units in a NEMA 1 enclosure at locations indicated.

Audible and Visible Alarm Notification Appliances: Mount as indicated on the contract drawings.

Fire Alarm Control Panel: Flush mount cabinets with top of cabinets at 66 inches above finished floor.

Transient Voltage Surge Suppression Device: Install device integral to one of the the FACP cabinets in a NEMA 1 enclosure. **Provide a #10 AWG ground wire in 1/2" EMT from TVSS device to the ground bus of the existing Square-D panelboard.**

System Instructions: Securely fasten framed system instructions to walls at 60" above finished floor.

WIRING AND RACEWAY INSTALLATION

General: Provide raceway and wiring to all equipment and devices indicated on the contract drawings. The contract drawings indicate partial raceway and wiring requirements to help clarify design intent. Where raceway and wiring is not indicated on the drawings for devices or equipment, the arrangement, grouping, and routing of raceway and wiring shall be provided in accordance with the National Electrical Code and in accordance with methods outlined in the contract specifications and drawings.

Wiring: Provide wiring in accordance with Division 16 specification section "Basic Electrical Materials and Methods".

Raceways: Install all wiring in metal raceway in accordance with Division 16 specification section "Basic Electrical Materials and Methods."

Wiring Within Enclosures: Install conductors parallel with or at right angles to the sides and back of the enclosure. Bundle, lace, and train the conductors to terminal points with no excess. **Connect conductors associated with the fire alarm system that are terminated, spliced, or interrupted to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors. Solder and/or wire nuts shall not be used.**

Cable Taps and Splices: Cable taps and splices shall be kept to a minimum and shall only be allowed in addressable signaling line circuits; cable taps and splices shall not be provided in notification appliance circuits (most alarm notification appliances have both incoming and outgoing connection terminals – with proper planning there should be no need to splice a notification appliance circuit). Provide numbered terminal strips in junction boxes, pull boxes, outlet boxes, cabinets, and equipment enclosures where any tap or splice is made. Solder and/or wire nuts shall not be used.

Color Coding: Color code all fire alarm conductors differently from the normal building power wiring. Provide one color code for audible notification appliance circuits and a different color code for visible notification appliance circuits. Provide a different color code for signaling line circuits. **Paint fire alarm system junction boxes and covers red.**

GROUNDING

Ground equipment and cable shields in accordance with the fire alarm system manufacturer's requirements. Cable shields shall be spliced using terminal blocks.

FIELD QUALITY CONTROL

Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

Pretesting: Upon completing installation of the system, align, adjust, and balance the system and perform complete pretesting. Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved. **Provide and prepare forms for systematic recording of acceptance test results.**

Report of Pretesting: After pretesting is complete, provide a letter certifying the installation is complete and fully operable. The letter shall include the names and titles of the witnesses to the preliminary tests.

Final Test Notice: Provide 10 days' minimum notice in writing when the system is ready for final acceptance testing.

Minimum System Tests: Test the system in accordance with the procedures outlined in NFPA 72. Minimum required tests are as follows:

Verify the absence of unwanted voltages between circuit conductors and ground.

Verify the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.

Test initiating and indicating circuits for proper signal transmission under open circuit conditions. One connection each should be opened at not less than 10 percent of the initiating and indicating devices. Proper signal transmission in accordance with class of wiring used shall be observed.

Test each initiating and indicating device for alarm operating and proper response at the control unit. Test smoke detectors with actual products of combustion.

Test the system for all specified functions in accordance with the manufacturer's operating and maintenance manual. Systematically initiate specified functional performance items at each station including making all possible alarm and monitoring initiations and using all communications options. For each item, observe related performance at all devices required to be affected by the item under all system sequences. Observe indicating lights, displays, alarm tones, Mass Notification announcements, Public Address announcement via microphone, and annunciator indications.

Test both primary power and secondary power. Verify, by test, the secondary power system is capable of operating the system for the period and in the manner specified.

Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Submit log upon the satisfactory completion of tests.

COMMISSIONING

Provide the services of a factory-authorized service representative to demonstrate and train Owner's maintenance personnel as specified below.

Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, programming smoke and heat detector sensitivity setpoints, and preventive maintenance of the system. **Provide 8 hours of training.**

Schedule training with the Owner in writing at least seven days in advance.

Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting detector sensitivity setpoints, audible

notification device sound intensities, programming, and controls to suit actual occupied conditions. **Provide three 8-hour visits to the site for this purpose.**

END OF SECTION 283100

