PROJECT MANUAL

T / G AHU - INDUSTRIAL & DOMESTIC
HOT WATER TANK

Project Number: H51-9794-PG-B

FOR

MEDICAL UNIVERSITY OF SOUTH CAROLINA
Charleston, South Carolina

July 22, 2016

BID DOCUMENTS
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**PROJECT NUMBER:** H51-9794-PG-B

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INVITATION FOR CONSTRUCTION SERVICES

PROJECT NAME: T/G AHU - Industrial & Domestic Hot Water Tank
PROJECT NUMBER: H51-9794-PG-B
PROJECT LOCATION: MUSC, Thurmond Gazes Research Building, Charleston, SC

BID SECURITY REQUIRED? Yes ☒ No ☐ NOTE: Contractor may be subject to a performance appraisal at the close of the project.
PERFORMANCE BOND REQUIRED? Yes ☒ No ☐ 
PAYMENT BOND REQUIRED? Yes ☒ No ☐ CONSTRUCTION COST RANGE: $250,000 - $500,000

DESCRIPTION OF PROJECT: Installation of new domestic and industrial water heaters and associated service piping and electrical systems located on the 9th floor of the MUSC Thurmond Gazes Research Building. Project also consist of one alternate which includes the demolition and removal of the existing domestic and industrial hot water tanks.

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM:
http://academicdepartments.musc.edu/vpfa/eandf/construction_project/index.html

PLAN DEPOSIT AMOUNT: $50.00 IS DEPOSIT REFUNDABLE Yes ☐ No ☐ N/A ☒ 
Bidders must obtain Bidding Documents/Plans from the above listed source(s) to be listed as an official plan holder. Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders that rely on copies of Bidding Documents/Plans obtained from any other source do so at their own risk. All written communications with official plan holders & bidders WILL ☒ WILL NOT ☐ be via email or website posting.

IN ADDITION TO THE ABOVE OFFICIAL SOURCE(S), BIDDING DOCUMENTS/PLANS ARE ALSO AVAILABLE AT:

All questions & correspondence concerning this Invitation shall be addressed to the A/E.
A/E CONTACT: Kevin L. Stanley
A/E ADDRESS: Street/PO Box: 2330 Main Street
City: Columbia State: South Carolina ZIP: 29201-
EMAIL: kstanley@mecainc.com
TELEPHONE: 803-765-9421 FAX: 803-765-9848

AGENCY: Medical University of South Carolina
AGENCY PROJECT COORDINATOR: Robert C. Branson
ADDRESS: Street/PO Box: 97 Jonathan Lucas Street, MSC 190
City: Charleston State: South Carolina ZIP: 29245-
EMAIL: bransonr@musc.com
TELEPHONE: 843-792-7502 FAX: 843-792-0251

PRE-BID CONFERENCE: Yes ☒ No ☐ TIME: 11:00AM MANDATORY ATTENDANCE: Yes ☒ No ☐ PLACE: E&F Rm PG209, 97 Jonathan Lucas St., Chas, SC
PRE-BID DATE: 8/16/2016 BID CLOSING DATE: 8/30/2016 TIME: 10:00AM PLACE: E&F Rm PG209, 97 Jonathan Lucas St., Chas, SC
BID DELIVERY ADDRESSES:
HAND-DELIVERY: Attn: Robert C. Branson MUSC Engineering & Facilities, Parking Garage, 2nd Floor 97 Jonathan Lucas Street, Charleston, SC 29425
MAIL SERVICE: Attn: Robert C. Branson MUSC Engineering & Facilities, Parking Garage, 2nd Floor 97 Jonathan Lucas Street, Charleston, SC 29425

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

APPROVED BY: [Signature] DATE: 7/28/16

SE-310
AIA Document A701- 1997,  
“Instructions to Bidders”  
Articles 1 through 8,  Pages 1 through 6,  
is hereby made part of these documents.  

An Original is on file in the Engineer’s Office located at:  

Engineer:  Mechanical Engineering Consulting Associates, Inc.  
2330 Main Street  
Columbia, South Carolina 29201
OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

AGENCY: Medical University of South Carolina

PROJECT NAME: T / G AHU - Industrial & Domestic Hot Water Tank

PROJECT NUMBER: H51-9794-PG-B

PROJECT LOCATION: MUSC, Thurmond Gazes Research Building, Charleston, SC

PROCUREMENT OFFICER: Robert C. Branson

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 the 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), Supplemental Instructions to Bidders, the Bid Form, the Notice of Intent to Award, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, 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.

2.6 Insert the following Sections 2.2 through 2.8:

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 a bid, the bidder certifies that—
   1. The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to—
      a. Those prices;
      b. The intention to submit a bid; or
      c. The methods or factors used to calculate the prices offered.
   2. The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and
   3. No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

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. a. 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.a, the term "principals" means the person(s) in the bidder’s organization responsible for determining the prices offered in this bid];
      b. As an authorized agent, does certify that the principals referenced in subdivision B.2.a 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
      c. 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-
   a. Bidder and/or any of its Principals-
      i. Are not presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any state or federal agency;
      ii. Have not, within a three-year period preceding this bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and
      iii. 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.a.(ii) of this provision.
   b. 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, Bidder must submit a written explanation regarding its inability to make the certification. The certification will be considered in connection with a review of the Bidder's responsibility. Failure of the Bidder to furnish additional information as requested by the Procurement Officer may render the Bidder nonresponsible.
OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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 a Bidder is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

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

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

2.6 RESTRICTIONS APPLICABLE TO BIDDERS & GIFTS
Violation of these restrictions may result in disqualification of your bid, suspension or debarment, and may constitute a violation of the state Ethics Act. (a) After issuance of the solicitation, bidder agrees not to discuss this procurement activity in any way with the Owner or its employees, agents or officials. All communications must be solely with the Procurement Officer. This restriction may be lifted by express written permission from the Procurement Officer. This restriction expires once a contract has been formed. (b) Unless otherwise approved in writing by the Procurement Officer, bidder agrees not to give anything to the Owner, any affiliated organizations, or the employees, agents or officials of either, prior to award. (c) Bidder acknowledges that the policy of the State is that a governmental body should not accept or solicit a gift, directly or indirectly, from a donor if the governmental body has reason to believe the donor has or is seeking to obtain contractual or other business or financial relationships with the governmental body. Regulation 19-445.2165(C) broadly defines the term donor.

2.7 IRAN DIVESTMENT ACT CERTIFICATION
(a) The Iran Divestment Act List is a list published by the State Fiscal Accountability Authority pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the following URL: http://procurement.sc.gov/PS/PS-iran-divestment.phtml. Section 11-57-310 requires the government to provide a person ninety days written notice before he is included on the list. The following representation, which is required by Section 11-57-330(A), is a material inducement for the State to award a contract to you. (b) By signing your Offer, you certify that, as of the date you sign, you are not on the then-current version of the Iran Divestment Act List. (c) You must notify the Procurement Officer immediately if, at any time before posting of a final statement of award, you are added to the Iran Divestment Act List.

2.8 OPEN TRADE REPRESENTATION (JUN 2015)
By submitting an Offer, Offeror represents that Offeror is not currently engaged in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [02-2A083-1]

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.”
OSE FORM 00201

STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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.

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.

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 shall 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 identify only those
subcontractors Bidder will use to perform the work of each listed specialty. Bidder must follow the Instructions in the
Bid Form for filling out this section of the Bid Form. Failure to properly fill out Section 7 may result in rejection of
Bidder’s bid as non-responsive.

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.

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 4.3.5:**

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

2.30 **Delete Section 4.4.2 and substitute the following:**

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

2.31 **In Section 5.1, delete everything following the caption “OPENING OF BIDS” and substitute the following:**

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

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

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

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

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

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

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

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

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

5.2.3 The Owner may reject a Bid as nonresponsive if the prices bid are materially unbalanced between line items or sub-line items. A bid is materially unbalanced when it is based on prices significantly less than cost for some work and prices which are significantly overstated in relation to cost for other work, and if there is a reasonable doubt that the bid will result in the lowest overall cost to the Owner even though it may be the low evaluated bid, or if it is so unbalanced as to be tantamount to allowing an advance payment.
OSE FORM 00201
STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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 E (Paragraph A(6)) to the Manual for Planning and Execution of State Permanent Improvement, Part II. Clarification of a Bid must be documented in writing and included with the Bid. Clarifications may not be used to revise a Bid or the Invitation for Bids. [Section 11-35-1520(8); R.19-445.2080]

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.”

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.
OSE FORM 00201

STANDARD SUPPLEMENTAL INSTRUCTIONS TO BIDDERS

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 (Available through SC Department of Revenue).

9.2 CONTRACTOR LICENSING

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

9.3 SUBMITTING CONFIDENTIAL INFORMATION

For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "CONFIDENTIAL" every page, or portion thereof, that Bidder contends contains information that is exempt from public disclosure because it is either (a) a trade secret as defined in Section 30-4-40(a)(1), or (b) privileged & confidential, as that phrase is used in Section 11-35-410. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the words "TRADE SECRET" every page, or portion thereof, that Bidder contends contains a trade secret as that term is defined by Section 39-8-20 of the Trade Secrets Act. For every document Bidder submits in response to or with regard to this solicitation or request, Bidder must separately mark with the word "PROTECTED" every page, or portion thereof, that Bidder contends is protected by Section 11-35-1810. All markings must be conspicuous; use color, bold, underlining, or some other method in order to conspicuously distinguish the mark from the other text. Do not mark your entire bid as confidential, trade secret, or protected! If your bid, or any part thereof, is improperly marked as confidential or trade secret or protected, the State may, in its sole discretion, determine it nonresponsive. If only portions of a page are subject to some protection, do not mark the entire page. By submitting a response to this solicitation, Bidder (1) agrees to the public disclosure of every page of every document regarding this solicitation or request that was submitted at any time prior to entering into a contract (including, but not limited to, documents contained in a response, documents submitted to clarify a response, & documents submitted during negotiations), unless the page is conspicuously marked "TRADE SECRET" or "CONFIDENTIAL" or "PROTECTED", (2) agrees that any information not marked, as required by these bidding instructions, as a "Trade Secret" is not a trade secret as defined by the Trade Secrets Act, & (3) agrees that, notwithstanding any claims or markings otherwise, any prices, commissions, discounts, or other financial figures used to determine the award, as well as the final contract amount, are subject to public disclosure. In determining whether to release documents, the State will detrimentally rely on Bidders's marking of documents, as required by these bidding instructions, as being either "Confidential" or "Trade Secret" or "PROTECTED". By submitting a response, Bidder agrees to defend, indemnify & hold harmless the State of South Carolina, its officers & employees, from every claim, demand, loss, expense, cost, damage or injury, including attorney’s fees, arising out of or resulting from the State withholding information that Bidder marked as "confidential" or "trade secret" or "PROTECTED".

9.4 POSTING OF INTENT TO AWARD

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

Room or Area of Posting: Bulletin Board Outside of Room 203
Building Where Posted: Parking Garage 1, Second Floor
Address of Building: 97 Jonathan Lucas Street, MSC 190, Charleston, SC 29425

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

9.8 TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS
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. Contractor shall comply with MUSC "M/WBE Requirements".

2. Contractor shall comply with MUSC "Tobacco-Free Campus Policy 49".

END OF DOCUMENT
AIA Document A310 - 2010, “Bid Bond”

is hereby made part of these documents.

An Original is on file in the Engineer’s Office located at:

Engineer: Mechanical Engineering Consulting Associates, Inc.
2330 Main Street
Columbia, South Carolina 29201
BID SUBMITTED BY: ________________________ 
(Bidder's Name)

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

FOR: PROJECT NAME: T/G AHU - Industrial & Domestic Hot Water Tank
PROJECT NUMBER: H51-9794-PG-B

OFFER

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

§ 2. Pursuant to Section 11-35-3030(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:

(Bidder, check all that apply. Note, there may be more boxes than actual addenda. Do not check boxes that do not apply)

ADDENDA: ☐ #1 ☐ #2 ☐ #3 ☐ #4 ☐ #5

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

§ 5. Bidder herewith offers to provide all labor, materials, equipment, tools of trade 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): Installation of new domestic and industrial water heaters and associated service piping and electrical systems located on the 9th floor of the MUSC Thurmond Gazes Research Building.

$__________________________, which sum is hereafter called the Base Bid.

(Bidder - insert Base Bid Amount on line above)
§ 6.2 BID ALTERNATES as indicated in the Bidding Documents and generally described as follows:

ALTERNATE # 1 (Brief Description): Demolition and removal of the existing domestic and industrial hot water tanks.

☐ ADD TO or ☐ DEDUCT FROM BASE BID: $ (Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each Alternate)

ALTERNATE # 2 (Brief Description): N/A

☐ ADD TO or ☐ DEDUCT FROM BASE BID: $ (Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each Alternate)

ALTERNATE # 3 (Brief Description): N/A

☐ ADD TO or ☐ DEDUCT FROM BASE BID: $ (Bidder to Mark appropriate box to clearly indicate the price adjustment offered for each Alternate)

§ 6.3 UNIT PRICES:

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

<table>
<thead>
<tr>
<th>No.</th>
<th>ITEM</th>
<th>UNIT OF MEASURE</th>
<th>ADD</th>
<th>DEDUCT</th>
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<td>1.</td>
<td>N/A</td>
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</table>
§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED
(See Instructions on the following page BF-2A)

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

<table>
<thead>
<tr>
<th>SUBCONTRACTOR CLASSIFICATION</th>
<th>SUBCONTRACTOR’S PRIME CONTRACTOR’S NAME</th>
<th>SUBCONTRACTOR’S PRIME CONTRACTOR’S SC LICENSE NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>By License Classification and/or Subclassification (Completed by Owner)</td>
<td>(Must be completed by Bidder)</td>
<td>(Requested, but not Required)</td>
</tr>
</tbody>
</table>

**BASE BID**

- Electrical

**ALTERNATE #1**

- Electrical

**ALTERNATE #2**

- N/A

**ALTERNATE #3**

- N/A

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

1. Section 7 of the Bid Form sets forth an Owner developed list of contractor/subcontractor specialties by contractor license category and/or subcategory for which bidder is required to identify the entity (subcontractor(s) and/or himself) Bidder will use to perform the work of each listed specialty.
   a. Column A: The Owner fills out this column, which identifies the contractor/subcontractor specialties for which the bidder must list either a subcontractor or himself as the entity that will perform this work. Subcontractor specialties are identified by contractor license categories or subcategories listed in Title 40 of the South Carolina Code of laws. If the owner has not identified a specialty, the bidder does not list a subcontractor.
   b. Columns B and C: In these columns, the Bidder identifies the subcontractors it will use for the work of each specialty listed by the Owner in Column A. Bidder must identify only the subcontractor(s) who will perform the work and no others. Bidders should make sure that their identification of each subcontractor is clear and unambiguous. A listing that could be any number of different entities may be cause for rejection of the bid as non-responsive. For example, a listing of M&M without more may be problematic if there are multiple different licensed contractors in South Carolina whose names start with M&M.

2. Subcontractor Defined: For purposes of subcontractor listing, a subcontractor is an entity who will perform work or render service to the prime contractor to or about the construction site pursuant to a contract with the prime contractor. Bidder should not identify sub-subcontractors in the spaces provided on the bid form but only those entities with which bidder will contract directly. Likewise, do not identify material suppliers, manufacturers, and fabricators that will not perform physical work at the site of the project but will only supply materials or equipment to the bidder or proposed subcontractor(s).

3. Subcontractor Qualifications: Bidder must only list subcontractors who possess a South Carolina Contractor’s license with the license classification and/or subclassification identified by the Owner in the first column on the left. The subcontractor license must also be within the appropriate license group for the work of the specialty. If Bidder lists a subcontractor who is not qualified to perform the work, the Bidder will be rejected as non-responsible.

4. Use of Own forces: If under the terms of the Bidding Documents, Bidder is qualified to perform the work of a listed specialty and Bidder does not intend to subcontract such work but to use Bidder’s own employees to perform such work, the Bidder must insert its own name in the space provided for that specialty.

5. Use of Multiple Subcontractors:
   a. If Bidder intends to use multiple subcontractors to perform the work of a single specialty listing, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word “and”.
   b. Optional Listing Prohibited: Bidder may not list multiple subcontractors for a specialty listing, in a form that provides the Bidder the option, after bid opening or award, to choose to use one or more but not all the listed subcontractors to perform the work for which they are listed. A listing, which on its face requires subsequent explanation to determine whether it is an optional listing, is non-responsive. If bidder intends to use multiple entities to perform the work for a single specialty listing, bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word “and” between the names of each entity listed for that specialty. Agency will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word “or”, a virgule (that is a /), or any separator that the Agency may reasonably interpret as an optional listing.

6. If Bidder is awarded the contract, bidder must, except with the approval of the Agency for good cause shown, use the listed entities to perform the work for which they are listed.

7. If bidder is awarded the contract, bidder will not be allowed to substitute another entity as subcontractor in place of a subcontractor listed in Section 7 of the Bid except for one or more of the reasons allowed by the SC Code of Laws.

8. Bidder’s failure to identify an entity (subcontractor or himself) to perform the work of a subcontractor specialty listed in the first column on the left will render the Bid non-responsive.
§ 8. LIST OF MANUFACTURERS, MATERIAL SUPPLIERS, AND SUBCONTRACTORS OTHER THAN SUBCONTRACTORS LISTED IN SECTION 7 ABOVE (FOR INFORMATION ONLY):

Pursuant to instructions in the Invitation for Construction Services, if any, Bidder will provide to Owner upon the Owner’s request and within 24 hours of such request, a listing of manufacturers, material suppliers, and subcontractors, other than those listed in Section 7 above, that Bidder intends to use on the project. Bidder acknowledges and agrees that this list is provided for purposes of determining responsibility and not pursuant to the subcontractor listing requirements of SC Code 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 180 Calendar Days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b) LIQUIDATED DAMAGES

Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the amount of $500.00 for each Calendar Day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This amount 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 laws of the State of South Carolina.

b) Bidder agrees that at any time prior to the issuance of the Notice to Proceed for this Project, this Project may be canceled for the convenience of, and without cost to, the State.

c) Bidder agrees that neither the State of South Carolina nor any of its agencies, employees or agents shall be responsible for any bid preparation costs, or any costs or charges of any type, should all bids be rejected or the Project canceled for any reason prior to the issuance of the Notice to Proceed.

§ 11. 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: 

BF 3  SE-330
SE-330
LUMP SUM BID FORM

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATION

SC Contractor's License Number(s): ________________________________

Classification(s) & Limits: ________________________________

Subclassification(s) & Limits: ________________________________

By signing this Bid, the person signing reaffirms all representation and certification made by both the person signing and the Bidder, including without limitation, those appearing in Article 2 of the Instructions to Bidders, is expressly incorporated by reference.

BIDDER'S LEGAL NAME: ________________________________

ADDRESS: ____________________________________________

........................................................................

TELEPHONE: ____________________________________________

EMAIL: ________________________________________________

SIGNATURE: __________________________ DATE: ___________

PRINT NAME: __________________________________________

TITLE: ________________________________________________
AIA Document A101- 2007,
“Standard Form of Agreement Between Owner and Contractor”
Articles 1 through 10, Pages 1 through 8,

is hereby made part of these documents.

An Original is on file in the Engineer’s Office located at:

Engineer: Mechanical Engineering Consulting Associates, Inc.
2330 Main Street
Columbia, South Carolina, 29201
OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

AGENCY: Medical University of South Carolina
PROJECT NAME: T / G AHU - Industrial & Domestic Hot Water Tank
PROJECT NUMBER: H51-9794-PG-B

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:


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 as provided in Section 9(a) of the Bid Form for this Project shall be measured from the Date of Commencement. 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, 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%).”

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


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.”
OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

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: Philip S. Mauney
Title: Director of Engineering
Address: 97 Jonathan Lucas Street, MSC 190, Charleston, South Carolina 29425
Telephone: 843-792-2490       FAX: 843-792-0251
Email: mauney@musc.edu

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

Name: Robert C. Branson
Title: Project Manager
Address: 97 Jonathan Lucas Street, MSC 190, Charleston, South Carolina 29425
Telephone: 873-792-7502       FAX: 843-792-0251
Email: bransonr@musc.edu

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

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

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

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: Kevin L. Stanley
Title: Vice President
Address: 2330 Main Street, Columbia, South Carolina 29201
Telephone: 803-765-9421       FAX: 803-765-9848
Email: kstanley@mecainc.com
OSE FORM 00501
STANDARD MODIFICATIONS TO AGREEMENT BETWEEN OWNER AND CONTRACTOR

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

   - SE-310, Invitation for Construction Services
   - Instructions to Bidders (AIA Document A701-1997)
   - OSE Form 00210, Standard Supplemental Instructions to Bidders
   - Contractor’s Bid (Completed Bid Form)
   - SE-370, Notice of Intent to Award

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

END OF DOCUMENT
AIA Document A201- 2007,  
“General Conditions of the Contract for Construction”  
Articles 1 through 15, Pages 1 through 38,  
is hereby made part of these documents.  

An Original is on file in the Engineer’s Office located at:  

Engineer: Mechanical Engineering Consulting Associates, Inc.  
2330 Main Street  
Columbia, South Carolina 29201
AGENCY: Medical University of South Carolina

PROJECT NAME: T / G AHU - Industrial & Domestic Hot Water Tank

PROJECT NUMBER: H51-9794-PG-B

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:
   3.2 Delete the language of Section 1.1.8 and substitute the word “Reserved.”
   3.3 Add the following Section 1.1.9:
      **1.1.9 NOTICE TO PROCEED**
      Notice to Proceed is a document issued by the Owner to the Contractor, with a copy to the Architect, directing the Contractor to begin prosecution of the Work in accordance with the requirements of the Contract Documents. The Notice to Proceed shall fix the date on which the Contract Time will commence.
   3.4 Insert the following at the end of Section 1.2.1:
      In the event of patent ambiguities within or between parts of the Contract Documents, the contractor shall 1) provide the better quality or greater quantity of Work, or 2) comply with the more stringent requirement, either or both in accordance with the Architect’s interpretation.
   3.5 Delete Section 1.5.1 and substitute the following:
      **1.5.1** The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as a violation of the Architect’s or Architect’s consultants’ reserved rights.
   3.6 Delete Section 2.1.1 and substitute the following:
      **2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization, except as provided in Section 7.1.2. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s Representative. [Reference § 8.2 of the Agreement.]
   3.7 Delete Section 2.1.2 and substitute the following:
      **2.1.2** The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to post Notice of Project Commencement pursuant to Title 29, Chapter 5, Section 23 of the South Carolina Code of Laws, as amended.
3.8 Delete Section 2.2.3 and substitute the following:

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

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

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

3.10 Delete Section 2.2.5 and substitute the following:

2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor with two hard copies and one electronic copy (.pdf format) of the Contract Documents. The Contractor may make reproductions of the Contract Documents pursuant to Section 1.5.2.

3.11 Add the following Sections 2.2.6 and 2.2.7:

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

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

3.12 Delete Section 2.4 and substitute the following:

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

3.13 Insert the following at the end of Section 3.2.1:

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

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

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

3.16 Delete the third 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 8 of the South Carolina Code of Laws, as amended, regarding withholding tax for nonresidents, employees, contractors and subcontractors.

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

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

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

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

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

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

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

acceptable to the Owner,

3.22 Delete Section 3.9.2 and substitute the following:

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

(Check box if applicable to this Contract)

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

3.25 Add the following Section 3.10.4:

3.10.4 Owner’s review and acceptance of Contractor’s schedule is not conducted for the purpose of either determining its accuracy and completeness or approving the construction means, methods, techniques, sequences or procedures. The Owner’s approval shall not relieve the Contractor of any obligations. Unless expressly addressed in a Modification, the Owner’s approval of a schedule shall not change the Contract Time.
3.26 Add the following Section 3.12.5.1:

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

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

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

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

3.29 Add the following Sections 3.13.2 and 3.13.3:

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

3.13.3 The Contractor and any entity for which 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.
3.37 *Insert the following at the end of Section 4.2.12:*

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

3.44 *Add the following Section 5.2.6:*

5.2.6 The Iran Divestment Act List is a list published by the State Fiscal Accountability Authority pursuant to Section 11-57-310 that identifies persons engaged in investment activities in Iran. Currently, the list is available at the following URL: [http://procurement.sc.gov/PS/PS-iran-divestment.phtm](http://procurement.sc.gov/PS/PS-iran-divestment.phtm). Consistent with Section 11-57-330(B), the Contractor shall not contract with any person to perform a part of the Work, if, at the time you enter into the subcontract, that person is on the then-current version of the Iran Divestment Act List.

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

5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor’s Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise herein or in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract
Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

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

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

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

3.46 Delete the last sentence of Section 5.4.1.

3.47 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.

3.48 Delete the language of Section 6.1.4 and substitute the word “Reserved.”

3.49 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.

3.50 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-380 “Construction Change Order”) and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

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

3.51 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 expenditure associated with the Architects’ review of the proposed revisions, except to the extent the revisions are accepted by execution of a Change Order.

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

3.52 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.

3.53 Delete Section 7.3.7 and substitute the following:

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

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

3.54 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.

3.55 Add the following Sections 7.5 and 7.6:

7.5 AGREED OVERHEAD AND PROFIT RATES

7.5.1 For any adjustment to the Contract Sum for which overhead and profit may be recovered, other than those made pursuant to Unit Prices stated in the Contract Documents, the Contractor agrees to charge and accept, as full payment for overhead and profit, the following percentages of costs attributable to the change in the Work. The percentages cited below shall be considered to include all indirect costs including, but not limited to: field and office managers, supervisors and assistants, incidental job burdens, small tools, and general overhead allocations. The allowable percentages for overhead and profit are as follows:
.1 To the Contractor for work performed by the Contractor’s own forces, 17% of the Contractor’s actual costs.

.2 To each Subcontractor for work performed by the Subcontractor’s own forces, 17% of the subcontractor’s actual costs.

.3 To the Contractor for work performed by a subcontractor, 10% of the subcontractor’s actual costs (not including the subcontractor’s overhead and profit).

7.6 PRICING DATA AND AUDIT

7.6.1 Cost or Pricing Data.

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

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

7.6.3 Records Retention.

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

3.56 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.

3.57 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.

3.58 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.

3.59 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.

3.60 Delete Section 9.3.1 and substitute the following:

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

3.61 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.

3.62 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,”

3.63 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.

3.64 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

3.65 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.

3.66 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 have been delivered to the Owner.
3.67 In Section 9.8.2, insert the word “written” after the word “comprehensive” and before the word “list.”

3.68 Delete Section 9.8.3 and substitute the following:

9.8.3.1 Upon receipt of the Contractor’s list, the Architect, with the Owner and any other person the Architect or the Owner choose, will make an inspection on a date and at a time mutually agreeable to the Architect, Owner, and Contractor, to determine whether the Work or designated portion thereof is substantially complete. The Contractor shall furnish access for the inspection and testing as provided in this Contract. The inspection shall include a demonstration by the Contractor that all equipment, systems and operable components of the Work function properly and in accordance with the Contract Documents. If the Architect’s inspection discloses any item, whether or not included on the Contractor’s list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion. If more than one Substantial Completion inspection is required, the Contractor shall reimburse the Owner for all costs of re-inspections 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.

3.69 In the second sentence of Section 9.8.5, delete the words “and consent of surety, if any.”

3.70 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.”

3.71 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 re-inspections or, at the Owner’s option, the costs may be deducted from payments due to the Contractor. If the Contractor does not achieve final completion within thirty days after Substantial Completion or the timeframe agreed to by the parties in the Certificate of Substantial Completion, whichever is greater, the Contractor shall be responsible for any additional Architectural fees resulting from the delay.

3.72 Delete the first sentence of Section 9.10.2 and substitute the following:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner’s property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days’ prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner, (6) required Training Manuals, (7) equipment Operations and Maintenance Manuals, (8) any certificates of testing, inspection or approval required by the Contract Documents and not previously provided (9) all warranties and guarantees required under or pursuant to the Contract Documents, and (10) one copy of the Documents required by Section 3.11.
3.73 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.

3.74 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.

3.75 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.

3.76 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.

3.77 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.

3.78 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.

3.79 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

3.80 Delete the language of Section 10.3.6 and substitute the word “Reserved.”

3.81 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.

3.82 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.
OSE FORM 00811
STANDARD SUPPLEMENTARY CONDITIONS

(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.

3.83 Delete Section 11.1.3 and substitute the following:

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

Prior to commencement of the Work, and thereafter upon renewal or replacement of each required policy of insurance, Contractor shall provide to the Owner a signed, original certificate of liability insurance (ACORD 25). Consistent with this Section 11.1, the certificate shall identify the types of insurance, state the limits of liability for each type of coverage, name the Owner a Consultants as Certificate Holder, provide that the general aggregate limit applies per project, and provide that coverage is written on an occurrence basis. Both the certificates and the endorsements must be received directly from either the Contractor's insurance agent or the insurance company. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, naming the Owner as an additional insured for claims made under the Contractor’s completed operations, and otherwise meeting the above requirements, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

3.84 Delete Section 11.1.4 and substitute the following:

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

3.85 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.

3.86 Delete the language of Section 11.3.1.2 and substitute the word “Reserved.”

3.87 Delete the language of Section 11.3.1.3 and substitute the word “Reserved.”
3.88 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.

3.89 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.

3.90 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.

3.91 Delete the language of Section 11.3.5 and substitute the word “Reserved.”

3.92 Delete Section 11.3.6 and substitute the following:

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

3.93 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.

3.94 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.

3.95 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.

3.96 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.
3.97  **Delete Section 11.4.1 and substitute the following:**

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

3.98  **Delete Section 11.4.2 and substitute the following:**

11.4.2  The Performance and Labor and Material Payment Bonds shall:

.1  be issued by a surety company licensed to do business in South Carolina;

.2  be accompanied by a current power of attorney and certified by the attorney-in-fact who executes the bond on the behalf of the surety company; and

.3  remain in effect for a period not less than one (1) year following the date of Substantial Completion or the time required to resolve any items of incomplete Work and the payment of any disputed amounts, whichever time period is longer.

3.99  **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.

3.100  **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.

3.101  **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.**

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

unless otherwise provided in the Contract Documents.

3.103  **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.

3.104  **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.

3.105  **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.
3.106 **Delete Section 13.3 and substitute the following:**

**13.3 WRITTEN NOTICE**

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

.1 upon actual delivery, if delivery is by hand;

.2 upon receipt by the transmitting party of confirmation or reply, if delivery is by electronic mail, facsimile, telex or telegram;

.3 upon receipt, if delivery is by the United States mail.

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

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

Unless expressly provided otherwise,

3.108 **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

15.6.5 Service of Process

3.109 **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.

3.110 **Delete the language of Section 13.7 and substitute the word “Reserved.”**

3.111 **Add the following Sections 13.8 through 13.17:**

13.8 PROCUREMENT OF MATERIALS BY OWNER

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

13.9 INTERPRETATION OF BUILDING CODES

As required by Title 10, Chapter 1, Section 180 of the South Caroline Code of Laws, as amended, OSE shall determine the enforcement and interpretation of all building codes and referenced standards on state buildings. The Contractor shall refer any questions, comments, or directives from local officials to the Owner and OSE for resolution.
13.10 MINORITY BUSINESS ENTERPRISES
Contractor shall notify Owner of each Minority Business Enterprise (MBE) providing labor, materials, equipment, or supplies to the Project under a contract with the Contractor. Contractor’s notification shall be via the first monthly status report submitted to the Owner after execution of the contract with the MBE. For each such MBE, the Contractor shall provide the MBE’s name, address, and telephone number, the nature of the work to be performed or materials or equipment to be supplied by the MBE, whether the MBE is certified by the South Carolina Office of Small and Minority Business Assistance, and the value of the contract.

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

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

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

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

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

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

13.17 OPEN TRADE (JUN 2015):
During the contract term, including any renewals or extensions, Contractor will not engage in the boycott of a person or an entity based in or doing business with a jurisdiction with whom South Carolina can enjoy open trade, as defined in SC Code Section 11-35-5300. [07-7A053-1]

3.112 Delete Section 14.1.1 and substitute the following:

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

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

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

3.113 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.

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

3.115 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.

3.116 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.

3.117 In Section 14.2.4, replace the words “Initial Decision Maker” with the word “Architect.”

3.118 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.

3.119 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.

3.120 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.

3.121 Delete Section 14.4.2 and substitute the following:

14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner’s convenience, the Contractor shall
.1 cease operations as directed by the Owner in the notice;
.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work;
.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders; and
.4 complete the performance of the Work not terminated, if any.

3.122 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.
3.123 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 State Fiscal Accountability Authority or the need to divert project funds to respond to an emergency as defined by Regulation 19-445.2110(B) of the South Carolina Code of Regulations, as amended;
.2 funding for the reinstated portion of the work has been restored;
.3 circumstances clearly indicate a requirement for the terminated work; and
.4 reinstatement of the terminated work is advantageous to the Owner.

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

3.124 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.

3.125 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.

3.126 Delete Section 15.1.3 and substitute the following:

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

3.127 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.

3.128 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) days per calendar month (non-cumulative) shall be anticipated as "adverse weather" at the job site, and such time will not be considered justification for an extension of time. If, in any month, adverse weather develops beyond the five (5) days, the Contractor shall be allowed to claim additional days to compensate for the excess weather delays only to the extent of the impact on the approved construction schedule and days the contractor was already scheduled to work. The remedy for this condition is for an extension of time only and is exclusive of all other rights and remedies available under the Contract Documents or imposed or available by law.
.3 The Contractor shall submit monthly with their pay application all claims for adverse weather conditions that occurred during the previous month. The Architect shall review each monthly submittal in accordance with Section 15.5 and inform the Contractor and the Owner promptly of its evaluation. Approved days shall be included in the next Change Order issued by the Architect. Adverse weather conditions not claimed within the time limits of this Subparagraph shall be considered to be waived by the Contractor. Claims will not be allowed for adverse weather days that occur after the scheduled (original or adjusted) date of Substantial Completion.
Delete Section 15.1.6 and substitute the following:

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

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

15.1.6.2 For the Contractor, listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) attorney's fees, (vi) any interest, except to the extent allowed by Section 13.6 (Interest); (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waive as against the Owner. Without limitation, this mutual waiver is applicable to all damages due to either party’s termination in accordance with Article 14.

15.1.6.3 Nothing contained in this Section shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

Add the following Section 15.1.7:

15.1.7 WAIVER OF CLAIMS AGAINST THE ARCHITECT
Notwithstanding any other provision of the Contract Documents, including Section 1.2.1, but subject to a duty of good faith and fair dealing, the Contractor waives all claims against the Architect and any other design professionals who provide design and/or project management services to the Owner, either directly or as independent contractors or subcontractors to the Architect, for listed damages arising out of or relating to this Contract. The listed damages are (i) lost revenue and profit, (ii) losses resulting from injury to business or reputation, (iii) additional or escalated overhead and administration expenses, (iv) additional financing costs, (v) attorney's fees, (vi) any interest; (vii) unamortized equipment costs; and, (viii) losses incurred by subcontractors for the types of damages the Contractor has waive as against the Owner. This mutual waiver is not applicable to amounts due or obligations under Section 3.18 (Indemnification).

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.

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

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

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

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

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

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

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

15.6 DISPUTE RESOLUTION

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

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

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

15.6.4 Without relieving any party from the other requirements of Sections 15.5 and 15.6, either party may initiate proceedings in the appropriate forum prior to initiating or completing the procedures required by Sections 15.5 and 15.6 if such action is necessary to preserve a claim by avoiding the application of any applicable statutory period of limitation or repose.
15.6.5 SERVICE OF PROCESS
Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any claims, claims, or controversies relating to the Contract; for any court action in connection therewith; or for the entry of judgment on any award made, may be served on Contractor by certified mail (return receipt requested) addressed to Contractor at the address provided for the Contractor’s Senior Representative or by personal service or by any other manner that is permitted by law, in or outside South Carolina. Notice by certified mail is deemed duly given upon deposit in the United States mail.

3.133 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)

The inspections required for this Work are:

(Indicate which services are required and the provider)

☐ Civil:
☐ Structural:
☒ Mechanical:
☐ Plumbing:
☒ Electrical:
☐ Gas:
☐ Other (list):

Remarks: All inspections provided by owner.

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

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

None

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

Refer to Specification Sections 017839, 017700, and 017700.01 of the Project Manual. The owner will not provide two hard copies of contract drawings to the contractor as noted in 2.2.5. The owner will provide an electronic copy of the document in pdf format.

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)

Refer to Specification Sections 013300, 017700.01, and 230200 of the Project Manual.

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

Refer to Specification Sections 011400, 015000, and 230200 of the Project Manual.

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

Refer to Specification Sections 011400, 015000, 017300.01, and 230200 of the Project Manual.

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

None
PROGRAM OBJECTIVES

1. MUSC/MUHA has adopted the following objectives:

   A. To provide maximum practical opportunities for Minority and Women's Business Enterprises (MWBEs) to participate as suppliers and contractors for our organization.

   B. To support the economic development of both small business enterprises and the minority community.

   C. To provide Minorities and Women equal opportunities for participation in Capital Projects construction (additions, renovations and new construction), procurement, professional services, and system-wide purchasing contracts.

   D. To provide procedures that will enable MUSC/MUHA to fulfill the goals of the State that are related to equal employment opportunities and affirmative actions in its construction contracts.

   E. To provide procedures for determining and monitoring MWBE participation and compliance with MWBE requirements stated in the contract documents. Also, to provide procedures for the solution of complaints concerning discrimination against any businesses holding contracts with the MUSC/MUHA.

   F. To evaluate and report to the MWBE Small and Minority Business Advocate and to MUSC/MUHA the results of contract activity, subject to the provisions of the MWBE Program.

2. In order to accomplish the objectives of the MWBE Program, the following specific goals have been established:

   A. To increase buying activities with Minority and Women's Enterprises that have the capability of providing construction services necessary for MUSC/MUHA operations.

   B. To actively and diligently seek out Minority and Women's Enterprises who have the potential of becoming a source of construction services.

   C. To promote awareness of the MWBE Program throughout MUSC/MUHA and the Community.

   D. To assist in the development of Minority and Women's Business Enterprise to insure that maximum opportunities are given to actively compete for construction opportunities with MUSC/MUHA.
SECTION I

GUIDELINES FOR M/WBE PARTICIPATION IN CONSTRUCTION SERVICES

CONSTRUCTION

These guidelines are established to accomplish the goal of providing for minority participation in Single and Multi-Prime capital construction contracts. The Medical University of South Carolina shall have a verifiable percentage goal of participation by Minority and Women’s businesses in the total value of work for each project for which a contract is awarded. These guidelines are published to accomplish that end.

ITEM 1:

INTENT

It is the intent of these guidelines that the Medical University of South Carolina and the contractors and subcontractors performing construction contracts for the Medical University of South Carolina shall cooperate, and in good faith, do all things legal, proper and reasonable to achieve the verifiable goal of 12% for participation by Minority and Women’s businesses in each construction project. Nothing contained in these guidelines shall be considered to require awarding authorities to award contracts or to make purchases of materials or equipment from M/WBE contractors who do not submit the lowest responsive responsible bid or bds.

ITEM 2:

DEFINITIONS

1. **Affirmative Action** - A plan, or specific measurable steps, taken by an agency, business or individuals to fully involve Minority Business Enterprises and Women’s Business Enterprises in contracts and programs and to assure non-discrimination and equal opportunities in the performance of work, contracts, or any elements of a project administered by MUSC/MUHA Minority/Women’s Business Enterprise Program.

2. **Bidder/Participant/Offeror** - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

3. **Contract** - A mutually-binding legal document which defines a business relationship or any modification at the level of performance which obligates the seller to furnish supplies, equipment, materials or services, knowledge in performing construction and procurements, and obligating the buyer to pay for services.

4. **Contractor** - Any person, firm, partnership, corporation, association, or joint venture that has been awarded a contract purchase or service agreement at any level with MUSC/MUHA or that has contracted with the Owner to perform construction work or repair.

5. **Discrimination** – Any action that distinguishes, differentiates, separates, or segregates one person or group from another, solely on the basis of age, race, religion, color, sex, national origin, handicap or veteran’s status.

6. **Goal** - An objective, expressed numerically to evaluate the type and amount of contract awards and performance of Minority- and Women-owned business enterprises.

7. **Good-Faith Effort** - All activity performed by bidders to encourage the participation of minority and women’s enterprises (M/WBE) in contracts covered under this plan.

8. **Joint Venture** - A legal merger of two or more businesses (separately-owned firms) for the purpose of submitting a single bid, to carry out a single business enterprise for profit, for which purpose they combine their property, capital, efforts, skills or knowledge.

9. **MUSC** – Medical University of South Carolina
10. MUHA – Medical University Hospital Authority

11. Minority (MBE) - a person who is a citizen or lawful permanent resident of the United States and who is:
   (a) African-American, that is, a person having origins in any of the original racial groups in Africa;
   (b) Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
   (c) Native-American, that is, a person having origins in any of the original peoples of North America; or
   (d) Asian-American, that is, persons having origin in any of the countries of the Far East, Southeast Asia, or the Indian areas.

12. Minority or Women’s Business Enterprises-MWBE - a business enterprise owned and controlled at a minimum of 51% by one or more members of a group defined as a minority or as women. A business certified as a minority- or woman-owned enterprise will show evidence of ownership and management interests and the daily business operations are real and continuing, not created solely to meet the MWBE requirements.

13. Owner – Medical University of South Carolina/Medical University Hospital Authority

14. Owned and Controlled - A business which is (1) a sole proprietorship legitimately owned by an individual who is a member of a minority and/or female, (2) a partnership or joint venture controlled by minorities and/or females, and in which at least 51% of the beneficial ownership interests legitimately are held by minorities and/or females, or (3) a corporation or other entity controlled by minorities and/or females, and in which at least 51% of the voting interests are legitimately held by minorities and/or females. In addition, these persons must control the management and operation of the business on a day-to-day basis.

15. Subcontractor - A firm under contract with the prime contractor for supplying materials or labor and materials and/or installations. The subcontractor may or may not provide materials in his subcontract. Work subcontracted in an emergency and which could not have been anticipated is excluded as a part of this program.

16. Verifiable goal – For purposes of the Single-Prime contracts, the advertising authority has adopted written guidelines specifying the actions that the prime contractor should consider taking to ensure a good-faith effort in the recruitment and selection of minority and women’s businesses for participation in contracts awarded; the required actions must be documented in writing by the contractor to the appropriate awarding authority.

PART 3:

RESPONSIBILITIES

1. Medical University of South Carolina/Medical University Hospital Authority - Owner

MUSC/MUHA under the Single and Multi Prime contract system will be responsible for the following:

   (a) For contracts in excess of $500,000 estimated cost, notify Minority and Women’s Business firms within twenty-one (21) days prior to the bid opening through means of advertising in the South Carolina Business Opportunities of the opportunities. Advertisements will include:
       1. Project description and location;
       2. Locations where bidding documents may be reviewed;
       3. Name of a representative of the Owner who can be contacted during the advertising period to advise who the prospective bidders are;
       4. Date, time and location of the bid opening.
       5. Date, time and location of pre-bid conference, if scheduled. The twenty-one day advance time period may be reduced to ten days for contracts in the range of $100,000 to $500,000 in the estimated cost.

   (b) The pre-bid conference, if scheduled, is conducted by the representative of the Owner, and will be open to all known and anticipated prime contractors, subcontractors, material suppliers, and other bidders.
2. **Prime Contractor, Bidder or Offeror**

Prime Contractors under the Single and Multi-Prime contract system will be responsible for the following:

(a) Attend the scheduled mandatory pre-bid conference.
(b) Identify or determine those work areas of a subcontract where M/WBEs may have an interest in performing subcontract work.
(c) Submit, with the first application for payment, a description of the portion of the work to be executed by M/WBEs expressed as a percentage of the total contract price.
(d) If the Contractor elects to use a M/WBE firm that is not certified by the Governor’s Office of Small and Minority Business Assistance (OSMBA) the Contractor shall encourage the subcontractor to submit an application for certification within thirty (30) days of signing the Letter of Intent (Appendix II). If the firm does not submit an application within the specified time frame or fails to meet the certification criteria, the contract amount with that M/WBE firm will not be considered as M/WBE participation.
(e) Upon being named the apparent low bidder, the Bidder shall submit to the Project Manager their good faith backup documentation if they have not met their M/WBE goal.
(f) If, during the construction of a project, additional subcontracting opportunities become available, the prime or general contractors must make good-faith efforts to solicit sub-bids from M/WBEs.

3. **M/WBE Responsibilities**

M/WBE firms do not have to be certified to be listed on the bid documents; however, M/WBE firms that have been awarded contracts will not be credited towards MUSC/MUHA's M/WBE Program unless they are certified with the Governor's Office of Small and Minority Business Assistance (OSMBA).

(a) M/WBEs should make every effort to establish contacts and relationships with contractors for potential future business, including attending pre-bid conferences and subscribing to industry and trade journals.

(b) In addition, M/WBEs who are contacted by Owners or Bidders should respond promptly whether or not they wish to submit a bid. If an M/WBE firm is listed as a subcontractor or supplier, they will be responsible for completing a Letter of Intent (Appendix II) in a timely manner and returning it to the Prime Contractor.

(c) M/WBE who are not certified at the time the firm commits to provide services, should apply for certification with the Governor’s Office of Small and Minority Business Assistance (CSMBA) within thirty (30) days. If the M/WBE firm fails to submit an application within the specified time frame or if the M/WBE firm is not granted certification by the Certification Committee, that M/WBE firm’s contract dollars will not be counted as M/WBE participation.
SECTION II

M/WBE CONTRACT PROVISIONS

ITEM 1: PROVISIONS FOR CONSTRUCTION

A. APPLICATION:

The requirements of the MUSC/MUHA Minority and Women's Business Enterprise (M/WBE) Provisions and Guidelines are hereby made a part of these contract documents. The requirements shall apply to all contractors regardless of ownership. Copies of the M/WBE Program may be obtained from the M/WBE Administrator, Engineering and Facilities, 97 Jonathan Lucas Street, P.O. Box 250190, Charleston, SC 29425.

B. M/WBE SUBCONTRACT GOALS:

The goals for participation by M/WBE as subcontractors on this project have been set at 12%.

The Bidder shall provide documented proof, with the first application for payment, in the form of Appendix I, M/WBE Utilization Commitment Form the percentage of M/WBE participation. Submit signed copies of Appendix II - Letters Of Intent to Perform as a Subcontractor, to the Project Manager.

C. COMPLIANCE DOCUMENTATION:

If the M/WBE subcontract goals are not achieved, the Bidder shall provide the following documentation to the Project Manager with the first application for payment:

1. M/WBE Utilization Commitment (Appendix I)

2. With the first pay application, the Bidder shall provide to the Project Manager signed Letters of Intent to Perform as a Subcontractor (Appendix II) for the M/WBE subcontractors listed on Appendix I.

3. After review of the Bidder’s Good Faith Efforts, the Bidder may request and be granted a Waiver of the M/WBE goals that have not been met for that particular project. A Waiver may be granted upon review of the Bidder’s documentation and determination that, in fact, a Good Faith Effort has been put forth.

NOTE: If the Bidder provides sufficient evidence on the M/WBE Utilization Commitment (Appendix I) that the goals have been met, or awards all subcontracts to M/WBEs, the Good Faith Efforts Documentation as listed above in #3 may not be required.
APPENDIX I
M/WBE UTILIZATION COMMITMENT FORM
FOR
CONSTRUCTION

We, ___________________________, do certify that on the ___________________________
(Bidder) ___________________________, we will expend a minimum of ______% of the total dollar amount of the contract with Minority/Women Business Enterprises. M/WBEs will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

If the bidder intends to subcontract, this form must be completed regardless of the amount of M/WBE participation attained.

<table>
<thead>
<tr>
<th>NAME OF FIRM</th>
<th>PHONE NUMBER</th>
<th>MBE OR WBE</th>
<th>Description of Work</th>
<th>Dollar Value</th>
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The undersigned will enter into a formal agreement with Minority/Women's Firms for work listed in this schedule conditional upon execution of a contract with the MUSC/MUHA.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: __________________________

(Name & Phone No. of Authorized Officer)

Signature: __________________________

Title: __________________________

APPENDIX I OR APPENDIX II MUST BE SUBMITTED WITH THE FIRST APPLICATION FOR PAYMENT
APPENDIX II
LETTER OF INTENT
TO
PERFORM AS A
SUBCONTRACTOR OR SUBCONSULTANT
(PROVIDE MATERIALS OR SERVICES)

PROJECT: (Project Name)

TO: (Name of Prime Bidder)

The undersigned intends to perform work in connection with the above project as

_____ Minority Business Enterprise   _____ Women’s Business Enterprise

_____ The M/WBE status of the undersigned is certified by the Governor’s Office of Small and Minority Business Assistance. Our M/WBE certification number is _____________________________.

_____ The M/WBE status of the undersigned is not certified by the Governor’s Office of Small and Minority Business Assistance. Our application was submitted on _________________________________.

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project (specify in detail particular work items, materials or services to be performed or provided) at the following price:

______________________________________________

You have projected the following commencement date for such work, and the undersigned is projecting completion of such work as follows:

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<tr>
<th>Items</th>
<th>Projected Commencement Date</th>
<th>Projected Completion Date</th>
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Subcontracting at any tier must be reported and is subject to all M/WBE compliance requirements. This form shall be used for M/WBE subcontracting at any level.

Date: ___________________  (Name & Phone No. of M/WBE Company)

_________________________  (Name & Title of Authorized Office)

_________________________  (Signature)

THE PRIME CONTRACTOR MUST GET THIS FORM COMPLETED BY THE M/WBE SUBCONTRACTORS

MUSC/MUHA

Rev. 10/14/08
APPENDIX III
MWBE DOCUMENTATION OF CONTRACT PAYMENTS FORM

Prime Contractor:__________________________________________________________
Address & Phone:__________________________________________________________
Project Name:____________________________________________________________
Pay Application #:_________________ Period:_______________________________

The following is a list of payments made to Minority and Women Business Enterprises certified by the Governor’s Office of Small and Minority Business Assistance on this project for the above mentioned period.

<table>
<thead>
<tr>
<th>MWBE FIRM NAME</th>
<th>INDICATE MBE OR WBE</th>
<th>OSMBA CERTIFICATION</th>
<th>AMOUNT TO BE PAID THIS PERIOD</th>
<th>TOTAL PAYMENTS TO DATE</th>
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</tr>
</tbody>
</table>

Date: ____________________________

Name of Authorized Officer

Signature

Title

SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT
HUMAN RESOURCES MANAGEMENT POLICY

TOBACCO-FREE CAMPUS

Policy 49

I. PURPOSE

MUSC is committed to promoting a healthy, tobacco-free environment for its employees, faculty, students, visitors and patients. The purpose of this policy is to provide a healthy environment, minimize the negative effects of passive smoke and tobacco use, maximize fire safety and promote wellness and good health habits within all MUSC facilities, including MUSC affiliates, and the surrounding campus.

II. POLICY

A. Covered Individuals

The provisions of this policy shall apply to all employees (including faculty and staff), patients, visitors, students, volunteers, contractors and vendors unless otherwise noted.

B. Use of Tobacco Products

1. The use of any tobacco product is prohibited in all buildings, grounds and spaces either leased or owned by the Medical University. The Human Resources Management Policy No. 49, Tobacco-Free Campus, includes, but is not limited to, offices, classrooms, laboratories, elevators, stairwells,
C. List of Tobacco Products

Tobacco products include, but are not limited to, cigarettes, cigars, pipes, chewing tobacco, e-cigarettes and other smokeless tobacco products.

III. INFORMATION AND PROCEDURE

A. Faculty/Staff/Volunteers

1. Faculty, staff and volunteers are expected to comply with the Tobacco-Free Campus Policy and assist with sharing information about the policy.

2. New employees and volunteers will be informed of the Tobacco-Free Campus Policy during orientation.

3. Enforcement of the policy rests with the appropriate supervisory staff, deans, department heads and administrative officials.

4. When employees or volunteers observe violations of the policy, they should politely remind the offender of the policy and request that they dispose of tobacco materials.

5. If the employee or volunteer continues to violate the policy, the location and time of the violation should be reported to the appropriate supervisory staff, dean, department head or administrative official. Human Resources Employee Relations may also be contacted to report violations.
6. Violation patterns will be assessed and appropriate action initiated. Employees who are found to be in violation will be disciplined in accordance with the Human Resources Policy No. 45, Disciplinary Action. Action may range from written reprimand to termination. Refer to specific guidelines as outlined by MUSC, MUHA and UMA.

B. Patients

1. Faculty, staff and clinical staff with patient care responsibilities are responsible for communicating and ensuring compliance with the Tobacco-Free Campus Policy.

2. Upon admission/check-in, patients will be verbally informed of the policy and a copy will be provided upon request.

3. Patients violating MUSC’s policy will be asked to dispose of tobacco materials.

4. Tobacco replacement therapies, i.e. nicotine patch, nicotine gum, etc., may be prescribed by the patient’s physician.

C. Visitors

1. Visitors will be informed of the policy and asked to comply while they are on campus.

2. Signage will be posted throughout MUSC’s buildings and grounds; stating this facility is a tobacco-free campus.

3. All employees and volunteers are encouraged to assist with the education of visitors regarding the policy, using policy information cards, which will be made available.

4. Employees are expected to help enforce the policy with visitors by requesting that they dispose of tobacco materials and respect MUSC’s healthcare mission and tobacco-free campus.

5. If a visitor is observed repeatedly violating the policy after being advised of the policy, staff should note the location and time of the violation and contact their respective manager, Department of Public Safety or Medical Center Safety and Security, or Human Resources.

D. Students

1. New students will be informed of the Tobacco-Free Campus Policy during orientation.

2. Enforcement of the policy rests with the respective Dean’s office.
3. When students observe violations of the policy, they should remind their fellow students of the policy and ask them to dispose of the tobacco materials.

4. If the student continues to violate the policy, the location and time of the violation should be reported to the appropriate Dean's office.

5. Violation patterns will be assessed and appropriate action initiated.

6. Affiliation agreements will include the Tobacco-Free Campus Policy so that students from other schools will be advised of the policy.

E. **Contractors/Vendors**

1. A provision will be inserted in all contracts, e.g. construction and/or maintenance, to prohibit the employees of contractors/vendors from using tobacco materials on property owned or leased by MUSC. Contractors and vendors are expected to ensure full compliance at all times with this policy by any employees and/or subcontractors providing services on MUSC property.

2. Failure by the contractor/vendor or their employees to comply with the provisions of this policy could result in contractors/vendors (or their employee(s) violating this policy) being asked to leave campus and/or the termination of the service contract with the contractor or vendor.

IV. **ENFORCEMENT**

A. The monitoring and enforcement of this policy is the responsibility of ALL MUSC/MUHA/UMA employees, students and volunteers. Each individual should consistently and politely bring any infraction of this policy to the attention of the person or persons observed violating the policy.

B. The MUSC Department of Public Safety and Medical Center Safety and Security will assist in the enforcement of this policy by reporting violations to the appropriate manager or supervisor. Employees are also expected to assume leadership roles by adhering to the policy provisions and by reminding others who aren't in compliance of the policy provisions.

C. MUSC will provide Tobacco-Free Campus Policy information cards to facilitate the education and enforcement of the policy.

V. **RESOURCES**

MUSC will offer resources and support to tobacco users in abstaining from tobacco use on campus and in supporting users who desire to quit using tobacco. Smoking cessation
classes and other tobacco education related resources or programs will be offered periodically for MUSC employees. Many of these programs are offered at little to no cost. Additional resources are outlined on the Tobacco-Free Campus website.

VI. EXCEPTIONS

Individuals enrolled in smoking research and/or treatment programs are permitted to smoke in designated smoking areas that are physically separated from care, treatment and service areas upon approval. If the Medical Center decides that patients may smoke in specific circumstances, it will designate smoking areas that are physically separated from care, treatment and service areas.

<table>
<thead>
<tr>
<th>Approved by:</th>
<th>Information Contact</th>
<th>Approved</th>
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<tbody>
<tr>
<td>Lisa P. Montgomery</td>
<td>Director of Human Resources</td>
<td>Effective</td>
</tr>
<tr>
<td>Vice President for Finance &amp; Administration</td>
<td>Management</td>
<td>March 1, 2012</td>
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<td>Revised</td>
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<td>June 2013</td>
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</table>
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: Medical University of South Carolina
                   Address: 97 Jonathan Lucas Street, MSC 190 Charleston, South Carolina 29425

                   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: T / G AHU - Industrial & Domestic Hot Water Tank
                   State Project Number: H51-9794-PG-B
                   Brief Description of Awarded Work, as found on the SE-330 or SE-332, Bid Form: Installation of new domestic and industrial water heaters and associated service piping and electrical systems located on the 9th floor of the MUSC Thurmond Gazes Research Building.

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

                   Name: Mechanical Engineering Consulting Associates, Inc.
                   Address: 2330 Main 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 \ 20\ (shall be no earlier than Date of Contract) BOND NUMBER \______________________

CONTRACTOR

                   By: \_______________________\ (Seal)
                   Print Name: \_______________________\ Print Title: 
                   Witness: 

SURETY

                   By: \_______________________\ (Seal)
                   Print Name: \_______________________\ Print Title: (Attach Power of Attorney)
                   Witness: 

(Additional Signatures, if any, appear on attached page)
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:
   5.1 Surety in accordance with the terms of the Contract; or
   5.2 Another contractor selected pursuant to paragraph 4.3 to perform the Contract.
5.3 The balance of the Contract Sum due either the Surety or another contractor shall be reduced by the amount of damages as described in paragraph 7.
6. If the Surety does not proceed as provided in paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond 15 days after receipt of written notice from the Agency to the Surety demanding that the Surety perform its obligations under this Bond, and the Agency shall be entitled to enforce any remedy available to the Agency.
6.1 If the Surety proceeds as provided in paragraph 4.4 and the Agency refuses the payment tendered or the Surety has denied liability, in whole or in part, then without further notice the Agency shall be entitled to enforce any remedy available to the Agency.
6.2 Any dispute, suit, action or proceeding arising out of or relating to this Bond shall be governed by the Dispute Resolution process defined in the Contract Documents and the laws of the State of South Carolina.
7. After the Agency has terminated the Contractor's right to complete the Contract, and if the Surety elects to act under paragraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Agency shall be those of the Contractor under the Contract, and the responsibilities of the Agency to the Surety shall those of the Agency under the Contract. To a limit of the amount of this Bond, but subject to commitment by the Agency of the Balance of the Contract Sum to mitigation of costs and damages on the Contract, the Surety is obligated to the Agency without duplication for:
   7.1 The responsibilities of the Contractor for correction of defective Work and completion of the Contract; and
   7.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under paragraph 4; and
   7.3 Damages awarded pursuant to the Dispute Resolution Provisions of the Contract. Surety may join in any Dispute Resolution proceeding brought under the Contract and shall be bound by the results thereof; and
   7.4 Liquidated Damages, or if no Liquidated Damages are specified in the Contract, actual damages caused by delayed performance or non-performance of the Contractor.
8. The Surety shall not be liable to the Agency or others for obligations of the Contractor that are unrelated to the Contract, and the Balance of the Contract Sum shall not be reduced or set-off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Agency or its heirs, executors, administrators, or successors.
9. The Surety hereby waives notice of any change, including changes of time, to the contract or to related subcontracts, purchase orders and other obligations.
10. Notice to the Surety, the Agency or the Contractor shall be mailed or delivered to the address shown on the signature page.
11. Definitions
11.1 Balance of the Contract Sum: The total amount payable by the Agency to the Contractor under the Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts to be received by the Agency in settlement of insurance or other Claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Contract.
11.2 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform the Contract or otherwise to comply with the terms of the Contract.
SE-357
LABOR & 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: Medical University of South Carolina  
Address: 97 Jonathan Lucas Street, MSC 190  
Charleston, South Carolina 29425  

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: T / G AHU - Industrial & Domestic Hot Water Tank  
State Project Number: H51-9794-PG-B  

Brief Description of Awarded Work, as found on the SE-330 or SE-332, Bid Form: Installation of new domestic and industrial water heaters and associated service piping and electrical systems located on the 9th floor of the MUSC Thurmond Gazes Research Building.

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

Name: Mechanical Engineering Consulting Associates, Inc.  
Address: 2330 Main 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 & Material Payment Bond to be duly executed on its behalf by its authorized officer, agent or representative.

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

CONTRACTOR  
By:  
(Seal)  
Print Name:  
Print Title:  
Witness:  

SURETY  
By:  
(Seal)  
Print Name:  
Print Title:  
Witness:  

(Additional Signatures, if any, appear on attached page)
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.
CHANGE ORDER NO.: _____

CHANGE ORDER TO CONSTRUCTION CONTRACT

AGENCY: Medical University of South Carolina
PROJECT NAME: T / G AHU - Industrial & Domestic Hot Water Tank
PROJECT NUMBER: H51-9794-PG-B

CONTRACTOR: ___________________________ CONTRACT DATE: __________

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

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<thead>
<tr>
<th>ADJUSTMENTS IN THE CONTRACT SUM:</th>
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<tbody>
<tr>
<td>1. Original Contract Sum:</td>
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</tr>
<tr>
<td>2. Change in Contract Sum by previously approved Change Orders:</td>
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</tr>
<tr>
<td>3. Contract Sum prior to this Change Order:</td>
<td>$ 0.00</td>
</tr>
<tr>
<td>4. Amount of this Change Order:</td>
<td></td>
</tr>
<tr>
<td>5. New Contract Sum, including this Change Order:</td>
<td>$ 0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ADJUSTMENTS IN THE CONTRACT TIME:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Original Substantial Completion Date:</td>
<td></td>
</tr>
<tr>
<td>2. Sum of previously approved increases and decreases in Days:</td>
<td>Days</td>
</tr>
<tr>
<td>3. Change in Days for this Change Order:</td>
<td>Days</td>
</tr>
<tr>
<td>4. New Substantial Completion Date:</td>
<td></td>
</tr>
</tbody>
</table>

CONTRACTOR ACCEPTANCE:
BY: ___________________________ Date: __________
(Signature of Representative)
Print Name: ___________________________

A/E 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 Contract Change Order Certification of: $ ________
☐ Change is not within Agency Construction Contract Change Order Certification of: $ ________

Office of the State Engineer Authorization for change exceeding Agency Construction Contract Change Order Certification:

AUTHORIZED BY: ___________________________ DATE: __________
(OSE Project Manager)
SECTION 01 10 00 - SUMMARY OF WORK

PART 1 GENERAL

1.1 SCOPE

BASE BID

A. Installation of new domestic and industrial water heaters and associated service piping and electrical systems located on the 9th floor of the MUSC Thurmond Gazes Building. The following list is meant to serve as a general description of the project. The contractor shall review drawings and specifications carefully to determine the complete scope of the project and not depend solely on the description below. Scheduling of project work entailing outages of services including but not limited to domestic water, steam, piping tie-ins, electrical tie-ins and connections, and equipment shutdown, change over and start-up will need to be planned.

B. Installation of new domestic and industrial water heaters.

C. Limited demolition for domestic and industrial package units to domestic water supply and return piping, steam and condensate service piping, insulation, valves, hangers, supports, brackets, steel support frames, controls, etc. as required to facilitate the modifications/component installations.

D. Provide new domestic water, steam, and condensate piping connections to existing piping. Install new pressure reducing stations.

E. Provide new electrical service for domestic and industrial package units including wiring, conduits, supports, rails, disconnects, switches, etc. and install complete.

F. Disposal of all equipment, wiring, steel, piping, etc. in accordance with local, state and federal regulations.

G. Removal, demolition, and replacement of roofs, ceilings, floors, slabs, etc. required for the replacement of mechanical and electrical equipment, piping, control panels, valves, actuators, electrical equipment, conduits, etc.

H. Insulation, painting, and labeling of all new piping systems and valves included in this contract.

I. Vibration and seismic restraints for all new equipment, devices, piping installed under this contract. Provide painting and labeling of all new piping in the facility to show the contents and direction of flow for all piping. Color for each type of piping is to be approved by Engineer.

J. The scope includes all associated mechanical, electrical, structural, and control work.
K. Provide appropriate personnel, equipment, chemicals, and procedures to flush and treat the water system to remove debris and substances that could impair the performance of the heat transfer surfaces. Water samples shall be taken and analyzed by a chemical treatment company approved by the Engineer and witnessed by a representative from the Engineer’s office. The system is to be certified as ready for use prior to any equipment being placed into service.

L. Start, test, adjust, balance and place into operation all systems. The building water and air distribution systems are to be balanced to provide the quantity of air and water as shown on drawings. System balance is to be accompanied with certified test forms as to obtained air and water quantities.

M. Provide a complete control system for the new mechanical equipment. All controls shall be compatible with the existing campus wide Johnson Controls. Johnson Controls shall provide all controls. Contractor shall coordinate all control, interlock and starting circuit wiring. Controls wiring shall be 120 volts or less. Provide transformers and relays as required to comply with this requirement. Conduit shall be steel conforming to the requirements of the Electrical Specifications, except as otherwise specified.

ALTERNATE NO. 1

A. Demolition and Removal of the existing domestic and industrial hot water tanks.

1.2 TIME OF COMPLETION AND LIQUIDATED DAMAGES

A. Time of completion: Unless an extension of time is granted, all work under this contract shall be substantially complete within 180 consecutive days from “Notice to Proceed”.

B. Liquidated Damages: Should the Contractor fail to substantially complete the work under this contract within the stipulated days plus any additional days that may result from extensions of time granted by the Owner, he agrees that the Owner may retain the sum of $500.00 per each calendar day, the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion. This amount is agreed upon as a reasonable and proper measure of Liquidated Damages, which the Owner sustains per day by failure of the Contractor to complete the work within the time stipulated. This sum is not to be construed in any sense as a penalty.

1.3 MANNER OF CONDUCT OF THE WORK

A. The existing building will be occupied during the “life of the contract”. The work shall be done and temporary facilities provided so that daily operations and essential services are not interrupted.

B. Noisy operations, such as drilling, hammering, etc. shall be restricted by the Owner to avoid disruption of daily activities. The Schedule of Operations shall be approved by the Owner.
C. No work shall be undertaken and no service shall be interrupted unless prior approval is received from the Owner at least ten (10) working days prior to the interruption. Every request from the Contractor to begin work in a new area or on another floor level or to interrupt any service or function must be made to the Owner sufficiently far in advance to allow review (at least five working days), approval and concurrence by the Owner’s Administrative Staff. All notifications to Owner and Engineer shall be in writing.

D. No jack-hammering will be allowed unless written permission is received from the Owner.

E. All holes will be core drilled using a diamond core drill.

F. The Contractor has sole responsibility for enforcing coordination requirements to prevent interruptions and for adhering closely to the schedule.

1.4 SPECIAL SITE CONDITIONS

A. The work area is inside, on and beside the Thurmond Gazes Building which is in daily use by the staff and faculty. Bidders are specifically advised that storage and work space will be restricted. Encroachment beyond these limits by the Contractor shall be rigorously avoided. Material must be kept in a neat and orderly manner and work area must be kept clean.

B. Trash and debris must be removed by Contractor daily. No food or drink will be allowed inside the existing Building or any renovated areas.

C. Construction Parking: Parking at the building site will be restricted to one (1) parking space. Contractor will be responsible for workers travel to and from the project site from a remote parking site. Deliveries of equipment and materials will be via the building loading dock where applicable and shall be limited to loading and unloading only. NO UNATTENDED VEHICLES WILL BE ALLOWED. DRIVERS MUST REMAIN WITH THE VEHICLES.

1.5 ACCESS TO THE BUILDING AND STORAGE

A. The contractor will be permitted to bring workmen, material, equipment, etc., into the Thurmond Gazes building through an entrance approved by MUSC.

B. Materials shall arrive on the site only as they are needed and immediately delivered to the limited construction area. Coordinate the construction site space needs with the Owner. Very limited space will be available outside the construction area.

C. Supplies, equipment and materials to be delivered to the construction area in closed containers sized to be conveniently transported through existing corridors and door openings.

D. The Contractor shall remove all waste material via the same route.

E. Remove all waste material from Owner’s property and legally dispose of it.
F. Debris, trash and unused materials shall be removed from the construction area and roof daily in closed containers which are sized to be conveniently transported through existing corridors and door openings.

1.6 WORK SCHEDULE

A. Working hours for this project will be 8:00 a.m. to 5:00 p.m. on weekdays. Nothing in the above work schedule shall void the Contractor’s option to perform overtime work if so desired. Also, some phases of the work can only be performed during off-hours, on weekends or at night. However, the Contractor shall receive no additional compensation for overtime work performed.

1. Contractor shall advise Owner of his intended work schedule and obtain their approval.
2. Contractor shall not do any electrical or mechanical work at any time which would interfere with the Owner’s service or function without first advising Owner of the nature, proposed time, and duration of the interruption and obtaining approval for the work.

B. The contractor shall present all requests for approval to the Owner not less than five working days before proposed work is scheduled to be done.

C. Nothing in the above-mentioned work schedule shall void the Contractor’s option to perform overtime work if he so desires and is so approved by the Owner. The Contractor is responsible for including all necessary cost to meet the schedule in the bid documents in the base bid. If the contractor requires overtime to meet the schedule in the bid documents, then the cost incurred are to be included in the base bid.

1.7 SAFETY COMPLIANCE

A. In addition to any detailed requirements of this specification, the contractor shall meet the requirements of federal and state standards referenced in Applicable Publications, whichever is more restrictive. Contractor must submit matters of interpretation of these standards to the respective administrative agency for resolution before starting work.

1.8 SEQUENCING OF CONSTRUCTION

A. It is the intent of these specifications that the work shall commence within ten (10) working days of the date of commencement as set forth in the “Notice to Proceed” and that all work shall be completed within the number of days specified.

B. The Contractor shall schedule the work in such a manner that will allow the Owner to fully occupy all spaces at all times. Scheduling of the work will be conducted with the contractor, the engineer and MUSC prior to commencement of the work.

C. No time extension shall be granted for equipment delivery.

END OF SECTION 01 10 00
SECTION 01 14 00 - CONTRACTOR’S USE OF PREMISES

PART 1 GENERAL

1.1 WORK INCLUDED

A. This section applies to situations in which the Contractor or his representatives including, but not necessarily limited to, suppliers, subcontractors, employees, and field engineers, entering upon the Owner's property.

B. Related Work: Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 01 of these Specifications.

1.2 QUALITY ASSURANCE

A. Promptly upon the award of the Contract, notify all pertinent personnel regarding requirements of this Section.

B. Require that all personnel who will enter upon the Owner's property certify their awareness of and familiarity with the requirements of this section.

1.3 TRANSPORTATION FACILITIES

A. Truck and equipment access:

1. To avoid traffic conflict with vehicles of the Owner's employees and customers, and to avoid over-loading of streets and driveways elsewhere on the Owner's property, limit the access of trucks and equipment to the designated "Contractor's Entrance".

2. Provide adequate protection for curbs and sidewalks over which trucks and equipment pass to reach the job site.

B. Contractor's vehicles:

1. Require contractor's vehicles, vehicles belonging to employees of the contractor, and all other vehicles entering the Owner's property in performance of the work of the contract, to use only the designated access route.

2. Do not permit such vehicles to park on any street or other area of the Owner's property except in the area to be designated.
1.4 SECURITY
   A. Restrict the access of all persons entering upon the Owner's property in connection with the work to the contractor's entrance and to the actual site of the work.

1.5 PROTECTION OF EXISTING PROPERTY
   A. This project involves work in and on the Psychiatric Institute Building. The contractor will be responsible for protecting existing items from damage during construction. This effort will be coordinated during the preconstruction meetings.
   B. After the completion of the construction, the condition of the area shall be restored to its original appearance at the contractor's expense.

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

1.7 MANNER OF CONDUCTION OF WORK
   A. The existing buildings will be occupied during the life of the contract. The work shall be done and such temporary facilities provided, so as not to interfere with the daily operation of the building or any essential service thereof.
   B. Noisy operations, such as drilling, etc shall be restricted by the Owner to avoid disruption of daily activities. The schedule of operation shall be approved by the Owner. No work shall be undertaken and no service shall be interrupted, which does not have the prior approval of the Owner. Every request from the contractor to begin work in a new area to interrupt any service shall have approval and concurrence by the Owner’s Administrative Staff.
   C. No jackhammering will be allowed unless written permission is received from the Owner. All holes will be core drilled using a diamond core drill.
   D. Responsibility from enforcing coordination requirements and close adherence to time schedule rests solely with the general contractor.
1.8 SPECIAL SITE CONDITIONS

A. Trash and debris shall be removed by contractor daily. No food or drink will be allowed inside the existing buildings or any renovated areas.

B. On-site storage and parking will be allowed only in designated area and shall be totally maintained by the General Contractor. This area shall suffice for employee parking, construction trailers and general storage of materials. If additional space is required it shall be the responsibility of the General Contractor to locate and furnish at no additional cost to the Owner. The contractor shall fence and secure the storage area as he deems necessary to secure and protect the area.

END OF SECTION 01 14 00
SECTION 01 25 00 - SUBSTITUTIONS (10 DAY PRIOR APPROVAL)

PART 1 GENERAL

1.1 WORK INCLUDED

A. To establish a mandatory method or system of submitting and approval or disapproval of various items, materials, equipment, products etc., in lieu of those specified or indicated.

B. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. The contract is based on the standards of quality established in the Contract Documents but specific reference in the specifications to any article, device, product, materials, fixture, form or type of construction, etc., by name, make, or catalog number, with or without the words "or equal", shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition and the Contractor in such cases may, at his option, use any article, device, product, material, fixture, form or type of construction which, in the judgement of the Architect/Engineer expressed in writing, is equal to that named.

B. Where quality and other characteristics are very nearly the same, the question of determining equal materials and readily available service sometime resolves itself to a matter of personal opinion and judgement and in these and all other cases involving the approval of materials, the opinion, judgement and decision of the Architect/Engineer and the Owner shall be final and bind all parties concerned.

C. The following products do not require further approval except for interface within the work:

1. Products specified by reference to standard specifications such as ASTM & similar standards.
2. Products specified by manufacturer's name and catalog model number.

1.3 REQUEST FOR APPROVAL

A. Requests for written approval to substitute materials or equipment considered by the Contractor as equal to those specified must have been submitted for approval ten (10) calendar days prior to bid opening date to the Architect/Engineer.

B. Format of Request:

1. Requests must be submitted to the Architect/Engineer in writing.
2. The written request must clearly identify the specification section (and paragraph if appropriate) along with any deviations from the specified product specification.

3. Identify compliance with pertinent standards of quality as listed under the “Quality Assurance” paragraph of part one of the specification section. Identify any deviations or alternate standards of quality.

4. Requests must be accompanied by samples, descriptive literature, and engineering information as necessary to fully identify and allow appraisal of the product.

C. Failure to comply with either the time frame for approval or format for the approval request (as identified in paragraphs A & B above) is in itself sufficient cause for rejection of the approval request.

1.4 APPROVED SUBSTITUTIONS

A. Approval of the Architect/Engineer to use materials and/or equipment, if granted, will have been in the form of a written addendum and will have been issued to all bidders of record. Approved substitutions may be used at Contractor's option.

B. Approval of an item submitted as a request for approval does not relieve that product from compliance with the specification section performance, quality, construction, material or warranty requirements.

C. No substitutions will be allowed, nor will an increase in Contract be allowed (for using materials specified) if substitutions have been requested later than ten (10) days prior to bid opening date.

END OF SECTION 01 25 00
SECTION 01 29 00 - SCHEDULE OF VALUES

PART 1 GENERAL

1.1 WORK INCLUDED
   A. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work for each project, as specified herein and in other provisions of the contract documents.

1.2 RELATED WORK
   A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these specifications.
   B. A “Schedule of Values” is required under the General Conditions. The minimum division of categories shall comply with requirements of this specification. The “Schedule of Values” is required to be compatible with the “Continuation Sheet” accompanying application for payment.

1.3 QUALITY ASSURANCE
   A. Use required means to assure arithmetical accuracy of the sums described.
   B. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer, substantiating the sums described.

1.4 SUBMITTALS
   A. Prior to first application for payment, submit proposed schedule of values to the Engineer.
      1. Meet with the Engineer and determine additional data, if any, required to be submitted.
      2. Secure the Engineer’s approval of the schedule of values prior to submitting first application for payment.
      3. A revised schedule of values shall be required after execution of a change order.

PART 2 PRODUCTS

2.1 ORGANIZATION
   A. The schedule of values shall be organized and titled under the standard CSI divisions. The contractor may provide additional sub-categories under these divisions as necessary for tracking of sub-contract costs, subject to approval by the Engineer.
Division 7 - Thermal and Moisture Protection
Roofs
   Roof Structure of Steel Fram
   Canopies
   Roof Covers
   Fireproofing

Division 8 - Doors and Windows
Doors
   Wood Doors
   Hollow Metal Doors
   Hardware

Division 9 - Finishes
Floors
   Quarry and Hard Tile
   Vinyl Tile
   Terrazzo and Resinous Flooring
   Carpet
   Ceramic Tile
   Hardwood

Division 22 - Plumbing
   Fixtures
   Piping
   Piping Insulation
   Water Heaters

Division 23 - Heating and AC
   Controls
   A/C Systems (over 20 tons)
   A/C Systems (over 5 less than 20 tons)
   A/C Systems (Less than 5 tons)
   Duct Work
   Piping
   Insulation
   Composite system-Heating, Ventilating and A/C
   Heat Pump System
   Chiller
Division 26 - Electrical
   Conduit and Wiring
   Fixtures
   Switchgear

Division 28 - Electronic Safety and Security
   Fire Alarm System
   **If it is an alarm system - need to specify this
   and not just indicate fire protection

END OF SECTION 01 29 00
SECTION 01 31 00 - PROJECT MEETINGS AND COORDINATION

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: To enable orderly review during progress of the work, and to provide for systematic discussion of problems, the Contractor shall conduct project meetings throughout the construction period. Meeting times and dates shall be set at the Pre-construction conference with the Owner’s Representative and Engineer present.

B. Related Work:

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

2. The Contractor’s relations with his subcontractors and material suppliers, and discussions relative thereto, are the Contractor’s responsibility and normally are not part of the project meetings content.

1.2 QUALITY ASSURANCE

A. For those persons designated by the Contractor to attend and participate in project meetings, provide required authority to commit the Contractor to solutions agreed upon in the project meetings.

1.3 SUBMITTALS

A. Agenda items: To the maximum extent practicable, advise the Owner’s representative at least 24 hours in advance of project meetings regarding items to be added to the agenda.

B. Minutes:

1. The Contractor will compile minutes of each project meeting and will furnish copies to the Owner, Architect/Engineer, and Subcontractors.

2. Recipients of copies may make and distribute such other copies as they wish. Meeting minutes shall include a complete synopsis of all discussions, decisions, and/or problems being encountered on the project, as well as an update of the schedule.
PART 2 PRODUCTS

NO PRODUCTS ARE REQUIRED IN THIS SECTION.

PART 3 EXECUTION

3.1 MEETING SCHEDULE
   A. Except as noted below for Preconstruction Meeting, project meetings will be held weekly.
   B. Coordinate as necessary to establish mutually acceptable schedule for meetings.

3.2 MEETING LOCATION
   A. The Contractor will establish meeting location. To the maximum extent practicable, meetings will be held at the job site.

3.3 PRECONSTRUCTION MEETING
   A. The pre-construction meeting shall be conducted by the agency’s Project Representative and the Engineer. Other attendees should include the agency’s construction project manager (if assigned), construction inspectors, the general contractor, major sub-contractors, and the OSE Project Manager. The Engineer shall take minutes of the meeting and provide all attendees with a copy of the items discussed.
   B. The agency shall give the OSE Project Manager a minimum of seven (7) days notice of the date, time, and place of any pre-construction meeting.
   C. Items for discussion during the pre-construction meeting are provided in the following Table-7.3.1
<table>
<thead>
<tr>
<th>Item No.</th>
<th>PRECONSTRUCTION CONFERENCE ITEM</th>
<th>USER COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Introduction of all team members and their responsibilities;</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Project organizational structure and chain of command;</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Duties and expectations of the Agency, A/E, and contractor,</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Contract disputes, mediation, partnering, resolution;</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Project scope of work;</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Schedule of values, schedule of completion;</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Schedule of progress meetings;</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Project work schedule, normal working hours, normal work week;</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Required notice for scheduling overtime, outages, interruptions;</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Safety issues - general and special;</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Temporary and permanent utilities;</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Security, keys, fencing, site access, limited access to certain areas;</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Project sign;</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Designated parking areas, delivery areas;</td>
<td></td>
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<tr>
<td>15.</td>
<td>Designated storage areas, bonded storage, security;</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Designated toilets, break areas, vending areas, smoking areas;</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Daily clean-up, trash removal, dumpster, trash areas;</td>
<td></td>
</tr>
<tr>
<td>Item No.</td>
<td>PRECONSTRUCTION CONFERENCE ITEM</td>
<td>USER COMMENTS</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>18.</td>
<td>Submittals, shop drawings, testing, reports, approval process;</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Required permits, licenses, local inspections, testing;</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Demolition items to be salvaged for agency, if any, notification, storage area;</td>
<td></td>
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<tr>
<td>21.</td>
<td>Requirement to locate utilities prior to excavation;</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Contractor’s bonds (as required by SC Law), names of surety companies, required notification for claims;</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Builders’ Risk Insurance and contractor’s insurance;</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Agency furnished equipment, rough-in, trim;</td>
<td></td>
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<tr>
<td>25.</td>
<td>Application for Payment in the form of AIA G702, payment dates, payment for stored materials;</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Prompt payments to contractors in 21 days, subcontractors 7 days thereafter;</td>
<td></td>
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<tr>
<td>27.</td>
<td>Timely notification by the Contractor in writing to the A/E of any alleged agency-caused delay and the estimated cost of the delay;</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Additional weather related time extensions monthly;</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Change orders, change directives, clarifications;</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Required inspections by A/E, agency, and inspectors (where applicable),</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>Inspection report routing;</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>Material and soil testing requirements;</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>Review requirements for substantial completion</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Substantial Completion inspection, and notification procedure</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 7.3-1. PRE-CONSTRUCTION CONFERENCE

<table>
<thead>
<tr>
<th>Item No.</th>
<th>PRECONSTRUCTION CONFERENCE ITEM</th>
<th>USER COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.</td>
<td>Substantial Completion certification by the A/E;</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Occupancy, Partial occupancy;</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Assessment of liquidated damages;</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Required Operation and Maintenance Manuals (<em>provide prior to Substantial Completion</em>);</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>Instruction and training of maintenance personnel (<em>provide prior to move-in/occupancy</em>)</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>Warranties, manufacturer start-up, guarantees (<em>provide prior to Substantial Completion</em>)</td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>Record drawings, as built drawings;</td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>Final Completion inspection, punch list;</td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>Retainage withheld, consent of surety company before release of retainage;</td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>One year inspection (A/E to inspect the facility 10 months after substantial Completion).</td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>Contractor is responsible for making corrections to items found during the warranty inspection.</td>
<td></td>
</tr>
</tbody>
</table>
3.4 PROJECT MEETINGS

A. Attendance

1. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of work.
2. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspect of the work is involved.

B. Minimum agenda:

1. Review, revise as necessary, and approve discussions, agreements and understanding of the previous meeting.
2. Review progress of the work since last meeting, including status of submittals for approval.
3. Identify problems that impede planned progress.
4. Develop corrective measures and procedures to regain planned schedule.
5. Complete other current business.

END OF SECTION 01 31 00
SECTION 01 32 00 - CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.1 WORK INCLUDED

A. To assure adequate planning and execution of the work and aid in completing construction within the number of calendar days allowed in the Contract, and to assist the Architect/Engineer in evaluating progress of the Work, prepare & maintain the schedules and reports described in this Section.

B. Documents affecting scheduling include, but are not limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these specifications.

1.2 DEFINITIONS

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

1.3 QUALITY ASSURANCE

A. Employ a scheduler who is thoroughly trained and experienced in compiling construction schedule, and in preparing and issuing periodic updates and reports as required. The scheduler shall be actively and regularly engaged in the practice of scheduling construction projects. The cost of providing the initial schedule and biweekly updates shall be part of the base bid.

B. Perform data preparation, analysis, charting, and updating in accordance with standards approved by the Architect/Engineer.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Submittals, section 013300.

B. Construction schedule: Within 30 calendar days after the Contractor has received the Notice to Proceed, submit one reproducible copy of a construction schedule.

C. Periodic revisions and reports: Submit one copy of the construction schedule updated along with the monthly payment request.
PART 2 PRODUCTS

2.1 CONSTRUCTION ANALYSIS

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

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE

A. As soon as practicable after receipt of Notice to Proceed, complete the construction analysis in preliminary form, meet with the Architect/Engineer, review contents of the proposed construction schedule, and make all revisions agreed upon.

3.2 PERIODIC REVISIONS AND REPORTS

A. As required under Paragraph 1.04-C above, update the approved construction schedule along with each payment certificate. Indicate "actual" progress in percent completion for each activity in blank space provided below listed activity and provide written narrative summary of revisions causing delay in the program, and an explanation of corrective actions taken or proposed.

END OF SECTION 01 32 00
SECTION 01 33 00 - SUBMITTALS

PART 1 GENERAL

1.1 COORDINATION WITH OTHER SECTIONS OF CONTRACT

A. Refer to other sections of the contract specifications for detailed submittal requirements for each Section. At a minimum, submittals must meet the requirements in this Section. More detailed submittals may be required by other Sections. The submittal must meet the most stringent of the requirements.

1.2 SUBMITTALS

A. Submit shop drawings, product data as required to the Owner in sufficient number to allow the Owner to retain two copies. Make all submittals at one time. Make all submittals no later than two weeks after receipt of the “Notice to Proceed.” Contact Engineer in advance if submittal will not be within two weeks of receipt of “Notice to Proceed.”

B. Shop drawings shall be submitted in a clear and thorough manner. Details shall be identified by reference to sheets and details, schedules and room numbers shown on the Contract Drawings and Division of the specification and indexed accordingly.

C. Product Data shall clearly identify pertinent products and models on each copy. Show performance characteristics, capacities, dimensions, clearances, wiring, piping diagrams, and controls as required. Modify manufacturer’s standard schematic drawings and diagrams to provide information specifically applicable to the work.

D. Samples shall be of sufficient size and quantity to clearly illustrate functional characteristics of the product.

1.3 CONTRACTOR RESPONSIBILITIES

A. Review Shop Drawings, Product Data and Samples prior to submission.

B. Determine and Verify:

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance with specifications

C. Coordinate each item submitted with requirements of the work and of the Contract Documents.

D. Notify the Owner in writing, at time of submission, of any deviations in the submittals from requirements of the contract Documents.
E. Do not begin fabrication (or any work that requires submittals) until submittals are returned with the Owner’s approval.

1.4 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other Contractor.

B. Number of submittals required:

1. Shop Drawings: Submit one reproducible transparency and one opaque reproduction.
2. Product Data: Submit the number of copies that the Contractor requires, plus two which will be retained by the Owner.
3. Samples: Submit the number stated in each specification Division.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The project title and number.
4. The names of:
   a. Contractor
   b. Supplier
   c. Manufacturer
5. Identification of the product, with the specification Division number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
10. Identification of revisions on re-submittals.
11. An 8 in. x 3 in. Blank space for Contractor and Owner stamps.
12. Contractor’s stamp, initialed or signed, certifying review of the submittal. Stamp and signature indicate that the following have been reviewed:
   • verification of products
   • field measurements
   • field construction criteria
   • coordination of the information within the submittal with requirements of the Work and Drawings
   • coordination of the information within the submittal with requirements of Contract Documents.

1.5 RESUBMISSION REQUIREMENTS

A. Make any corrections or changes in the submittals required by the Owner and resubmit until approved.

B. Shop Drawings and Product Data:
1. Revise initial drawings or data, and resubmit as specified for the initial submittal.

1.6 DISTRIBUTION: Distribute reproductions of Shop Drawings and copies of product Data that carry the Owner stamp of approval to:

A. Job site file.
B. Record Documents file.
C. Other affected contractors.
D. Subcontractors.
E. Supplier or Fabricator.

1.7 OWNER DUTIES

A. Review submittals with reasonable promptness and in accordance with approved schedule.

B. Affix stamp and initials or signature, and indicate requirements for re-submittal, or approval of submittals.

C. Return submittals to Contractor for distribution, or for resubmission.

END OF SECTION 01 30 00
SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Contractor’s quality-control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

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

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

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 SUBMITTALS

A. Qualification Data: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
B. Reports: Prepare and submit certified written reports that include the following:

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

1.5 QUALITY ASSURANCE

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

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

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

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

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

F. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.
1.6 QUALITY CONTROL

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

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

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

1. Where services are indicated as Contractor’s responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least [24] hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor’s responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Document are Contractor’s responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

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

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


1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.
F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

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

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

1. Schedule times for tests, inspection, obtaining samples, and similar activities.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 REPAIR AND PROTECTION

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

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.

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

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

END OF SECTION 01 40 00
SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Contractor shall furnish, maintain and remove at completion of project, all temporary equipment that is required for the proper execution of work of all trades and is further described in this section of specifications.

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

C. Inspect equipment furnished by subcontractors to insure that equipment complies with requirements of pertinent safety regulations.

D. Maintain temporary facilities and controls in proper and safe condition throughout progress of the work.

PART 2 PRODUCTS

2.1 CONTRACTORS’ TEMPORARY EQUIPMENT

A. Contractor shall furnish, maintain and remove at completion equipment such as temporary stairs, ladders, ramps, chutes, and like facilities, as required for proper execution of the work.

B. Contractor shall coordinate the provisions of exterior and interior scaffolding required for execution of this work. Such scaffolding shall conform to requirements of authorities having jurisdiction over such work and be maintained in safe condition at all times. Remove when no longer required.

2.2 LIFTING DEVICES AND HOISTING FACILITIES

A. Contractor shall provide, operate, and maintain construction elevators, or cranes as well as other type hoists and hoisting material as may be required for execution of all trades’ work. Such apparatus, equipment and construction shall meet requirements of labor laws and other state or local laws.

2.3 BARRIERS

A. Comply with Federal, State, and Local codes and regulations.

B. Contractor shall provide and maintain bracing, shoring, sheeting, lights (warning and exit), guardrails, barricades, warning signs and other features necessary to adequately protect persons and property. When the need no longer exists remove such protective devices and/or procedures.
2.4 SECURITY ENCLOSURES AND PRECAUTIONS

A. Contractor shall provide all temporary enclosures required for protecting the project from the exterior, for providing passageways, for the protection of openings both exterior and interior and any other location where temporary enclosures and protection may be required.

B. Contractor shall take adequate precautions against fire, keep flammable material at an absolute minimum, and ensure that such material is properly handled and stored.

2.5 TELEPHONE SERVICE

A. Contractor shall provide and maintain a job telephone for the duration of the contract, and shall pay all costs in connection therewith. Toll calls shall be paid for by the party making the call.

2.6 TEMPORARY SANITARY FACILITIES

A. Permanent toilet facilities may be used by the construction personnel upon written permission of the Owner and subject to conditions mutually agreed to in writing.

2.7 TEMPORARY ELECTRICITY

A. The Contractor shall make the necessary arrangements and provide all temporary electrical services and lighting required during construction. Electricity at its source shall be furnished to Contractor by Owner.

2.8 TEMPORARY WATER DURING CONSTRUCTION

A. The contractor shall make arrangements to provide all water required during construction. Water, at source, to be furnished by the Owner.

2.9 ACCESS ROADS AND PARKING AREAS

A. Access to site for delivery of construction equipment and materials shall be made only from locations designated by Owner.

B. Parking of employee and Contractor vehicles on the site shall be limited to area or areas shown on drawings, or where not shown, as approved by Owner. Vehicles illegally parked will be removed from site at the expense of vehicle owner.
2.10 EXISTING BUILDING, NEW CONSTRUCTION SEPARATION

A. Contractor shall provide temporary enclosures to separate work areas from the areas of existing buildings occupied by Owner; to prevent penetration of dust or moisture into occupied areas, to prevent damage to existing equipment, and to protect Owner’s employees and operations from construction work.

B. Use framing and sheet materials which comply with structural and fire rating requirements of applicable codes and standard for temporary partition and ceiling enclosures.

C. Close joints between sheet materials and seal edges and intersections with exiting surfaces, to prevent penetration of dust or moisture.

D. In locations where painting is required, use fire-retardant paint providing a maximum flame spread of 25 when tested under ASTM E 84 or as required by local regulations.

E. Contractor shall provide HEPA filtered negative pressure fans for the purpose of negative pressure in all construction areas in the Hospital. The discharge of the negative pressure fans and filters shall to the outside of the facility and shall not be located within 25 feet of any outside air intakes for hospital HVAC systems. Construction space pressure shall be maintained at negative 0.01” w.c.

F. Contractor shall provide Plywood or equal to insure the proper protection of the existing roofing system and skylights.

G. All unused and stored gas cylinders shall be chained and secured.

PART 3 EXECUTION

3.1 TEMPORARY FACILITIES AND CONTROLS

A. Requirements of Regulatory Agencies: Comply with Federal, State and local codes and regulations and with utility company requirements.

B. Materials, General: Materials may be new or used suitable for the intended purpose, must be adequate in capacity for required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

C. The Contractor shall provide all weather protection and temporary cooling as necessary to carry on the work being conducted in the building. Contractor shall maintain properly conditioned working conditions except at specific times approved in advance by the Owner.

D. At completion of the work, when existing equipment has been utilized, the Contractor shall restore all equipment to “Original Condition.” This shall include replacement of all filters, painting, and other servicing required.
3.2 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the work.

B. Remove such temporary facilities and controls as rapidly as progress of the work will permit, or as directed by the Architect/Engineer.

C. At the completion of contract, remove all temporary buildings, sheds and trailers from the site and leave the grounds in the condition specified in other sections.

END OF SECTION 01 50 00
PART 1 GENERAL

1.1 WORK INCLUDED: This Section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:

A. Make the several parts fit properly.
B. Uncover Work to provide for installation, inspection, or both of ill-timed Work.
C. Remove and replace Work not conforming to requirements of the Contract Documents.
D. Remove and replace defective Work.
E. The work of this section shall include all patching of any existing substrate or finish material that is displaced, disturbed, marred or otherwise damaged by the operations of the work of this contract.
F. Patching is herein further understood to include replacement of certain materials that, by their nature, cannot be patched such as resilient base, resilient flooring, etc. This statement primarily concerns itself with finishes in existing areas indicated to remain as part of the finished project.
G. For alterations and additions the repair of all damages made by cutting shall include restoring those surfaces to their original state of finish, including surface texture, design color, etc., unless new finishes are called for. All such repairs shall be performed by personnel trained and proficient in the particular trades involved; i.e., plaster repairs by plasterers, masonry repairs by masons, tile repairs by tile setters, etc. Masonry and tile repairs shall be toothed to maintain bond or pattern. It is the intent of these specifications that all areas requiring repairs shall be restored to a completely finished condition, acceptable to the Owner.

1.2 INSPECTION

A. The contractor shall visit the building, inspect the areas in which work is to be performed and determine for himself the types and extent of finishing materials existing.
B. He shall determine which materials will probably require patching and which will probably require replacement and to what extent.
C. Failure to do so will not relieve him from this responsibility to conform to the requirements of this section.
1.3 RELATED WORK DESCRIBED ELSEWHERE

A. In addition to other requirements specified, upon the Owner’s request, uncover Work to provide for inspection by the Owner of covered Work; and remove samples of installed materials for testing.

B. Do not cut or alter work performed under separate contract without the Owner’s written permission.

1.4 QUALITY ASSURANCE

A. Perform all cutting and patching in strict accordance with pertinent requirements of these Specifications and, in the event no such requirements are determined, in conformance with the Owner’s written direction.

1.5 SUBMITTALS

A. Request for the Owner’s consent:
   1. Prior to cutting which affects structural safety, submit written request to the Owner for permission to proceed with cutting.
   2. Should conditions of the Work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Owner and secure his written permission prior to proceeding.

B. Notices to the Owner
   1. Prior to cutting and patching pursuant to the Owner’s instructions, submit cost estimate to the Owner. Secure the Owner’s approval of cost estimate and type of cost reimbursement before proceeding with cutting and patching.
   2. Submit written notice to the Owner designating time the work will be uncovered, to provide for the Owner’s observation.

PART 2 PRODUCTS

2.1 MATERIALS: For replacement of Work removed, use materials which comply with the pertinent sections of these specifications.

2.2 PAYMENT FOR COSTS: The Owner will reimburse the contractor for cutting and patching performed pursuant the Owner’s written request after claim for such reimbursement is submitted by the Contractor. Perform all other cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.
2.3 EXISTING ADJACENT FINISHES

A. The intent of this specification is that all finished surfaces shall present an unblemished finished appearance conforming to existing adjoining materials and colors.

PART 3 EXECUTION

3.1 CONDITIONS

A. Inspection:
   1. Inspect existing conditions, including elements subject to movement or damage during cutting and patching.
   2. After uncovering the Work, inspect conditions affecting installation of new Work.

B. Discrepancies:
   1. If uncovered conditions are not as anticipated, immediately notify the Owner and secure needed directions.

3.2 PREPARATION PRIOR TO CUTTING: Provide all required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.3 PERFORMANCE: Perform cutting and demolition by methods which will prevent damage to other portions of the Work and will provide proper surfaces to receive installation of repair and new work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.

3.4 CONCRETE

A. Concrete shall be patched by cutting out old concrete to remove loose aggregate cement with rectangular sides. Apply approved bonding agent to old concrete to insure firm juncture of new and old.

3.5 CLEAN UP

A. Remove all debris and excess material from the site and legally dispose of it.

END OF SECTION 01 73 00
SECTION 01 74 00 - CLEANING

PART 1 GENERAL

1.1 WORK INCLUDED

A. Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this section.

B. Execute cleaning, during progress of the work, and at completion of the work, as required by General Conditions.

C. In addition to standards described in this Section, comply with requirements for cleaning for specific products or work as described in their sections of these specifications.

D. Related Documents: Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.2 QUALITY ASSURANCE

A. Conduct daily inspection, and more often if necessary, to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

1.3 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations, and anti-pollution laws.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

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

B. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

C. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.
D. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.1 GENERAL PROGRESS CLEANING

A. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.

B. Do not allow accumulation of scrap, debris, waste material, and other items not further required for construction of this work.

C. At least twice each week, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

D. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.

3.2 SITE PROGRESS CLEANING

A. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove such items to place designated for their storage.

B. Weekly, and more often if necessary, inspect all arrangements of materials stored on site. Restack, tidy, or otherwise service arrangements to meet the requirements of Subparagraph 3.01A above.

C. Maintain the site in a neat and orderly condition at all times.

D. Execute periodic cleaning to keep work, site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

E. Remove waste materials, debris and rubbish from site and dispose of at a legal disposal area away from the site.

3.3 STRUCTURES PROGRESS CLEANING

A. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Relocate such items to the place designated for their storage.

B. Weekly and more often if necessary, sweep interior spaces broom clean.

C. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using equipment and materials required to achieve the necessary cleanliness.
3.4 DUST CONTROL

A. Clean interior spaces prior to start of finish painting and continue cleaning on an as-needed basis until painting is finished.

B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.5 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. "Clean", for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

C. Remove all traces of soil, grease, mastic, waste materials, adhesives, dust, dirt, stains, smudges, fingerprints, labels, and other foreign materials from sight exposed interior and exterior surfaces.

D. Wash and polish glazing and mirrors.

E. Polish surfaces requiring routine application of buffed polish, apply the polish recommended by the manufacturer of the material being polished.

F. Ventilating Systems:
   1. Clean permanent filters and replace disposable filters if units were operated during construction.
   2. Clean ducts, blowers and coils if units were operated without filters during construction.

G. Prior to final completion, or Owner occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces, and all work areas, to verify that entire work is clean.

H. Schedule final cleaning as approved by the Architect/Engineer to enable the Owner to accept a completely clean Project.

I. Owner will assume responsibility for cleaning as of time designated on Certificate of Substantial Completion for Owner's acceptance of Project or portion thereof; except for cleaning required due to execution of punch list items, which shall remain the responsibility of the General Contractor.

END OF SECTION 01 73 00.01
SECTION 01 77 00 - CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 WORK INCLUDED

A. To provide an orderly and efficient transfer of the building and building component information to the Owner. Closeout submittals shall consist of the following items:
   - Closeout, Warranty and Operation and Maintenance Documents
   - Record (as-built) Drawings and Specifications

1.2 QUALITY ASSURANCE

A. One copy of all project closeout submittals shall be forwarded to the Engineer for review and approval prior to forwarding the information required by this section to the Owner. Approval of these documents shall be considered as a pre-requisite for certification of Final Completion.

1.3 MATERIALS LIST

A. Furnish the Owner, three identical copies of a typewritten list showing every manufactured item / material used on the job. Include catalog number, manufacturer’s name and address, distributor’s name and address. Type the lists neatly and index them according to respective sections of specifications.

1.4 CLOSEOUT, WARRANTY, OPERATION AND MAINTENANCE DOCUMENTS

A. Prepare two 3-ring binder titled with the name of the project and date. The binder shall contain, in order, the following information:
   1. The Contractor’s name, address, telephone number, fax number and the name of the project manager. Provide contact information for the Contractor’s representative that includes telephone and beeper numbers where the person can be reached for emergency service at all times including nights, weekends, and holidays.
   2. The names, addresses, telephone numbers for each major subcontractor.
   3. Evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to Certificate of Inspection for Plumbing, Mechanical and Electrical.
   4. Certificate of Insurance for products and completed operations.
   5. Evidence of payment and release of liens.
   6. In order of division, following the order of the section of this specification, all warranty information specifically required by the sections of this specification.
7. In order of division -- following the order of the sections of this specification -- catalogs, wiring and control diagrams, manufacturer’s data, maintenance and operation instructions, parts lists on all devices, fixtures, machines, appliances, mechanical and electrical equipment, etc., for permanent maintenance records.

8. 6 Electronic copy of all of the above materials and information in PDF format on CD.

B. Arrange to instruct operating and maintenance personnel of Owner in use and maintenance of mechanical systems and associated control systems and specialty equipment provided under this contract. Submit letter showing when training was held and who attended.

1.5 COMPLETE AND SUBMIT SE-560 Certificate of Final Completion to the Engineer and request a final inspection.

1.6 COMPLETE AND SUBMIT AIA G706 Contractor’s Affidavit of Payment of Debts and Claims.

1.7 COMPLETE AND SUBMIT AIA G706A Contractor’s Affidavit of Release of Liens.

1.8 PROVIDE a clean and readable set of project Record Documents showing all deviations or changes in routing, location, or installation procedures made during the course of construction. Deliver Record Documents to Architect/Engineer for Owner. Refer to Section 017839 for details. Accompany this submittal with a transmittal letter, in duplicate, containing:
   • Date
   • Project Title and commission number
   • Contractor’s name and address
   • Title and number of each Record Document
   • Signature of contractor or his authorized representative

1.9 COMPLETE AND SUBMIT the Consent of Surety to Final Payment on AIA Document G-707, latest edition.

1.10 PROVIDE AIA Documents G715 Instruction Sheet and Attachment for Acord Certificate of Insurance issued by an authorized representative of the contractor’s insurance company certifying completed project insurance coverage as required by the contract documents.

1.11 A STATEMENT that the Contractor knows of no reason that the completed project insurance will not be renewable to cover the period required by the contract documents.

1.12 RETURN ALL CONTRACTOR’S Identification Badges prior to receipt of final payment.

END OF SECTION 01 70 00
SECTION 01 78 00 - PROJECT CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 WORK INCLUDED

A. To provide an orderly and efficient transfer of the building and building component information to the Owner. Closeout submittals shall consist of:

1. Closeout, Warranty & Operation and Maintenance Documents
2. Record (as-built) Drawings

1.2 QUALITY ASSURANCE

A. One copy of all project closeout submittals shall be forwarded to the Architect/Engineer for review and approval prior to forwarding the information required by this section to the Owner. Approval of these documents shall be considered as a pre-requisite for certification of Final Completion.

1.3 CLOSEOUT, WARRANTY & OPERATION AND MAINTENANCE DOCUMENTS

A. At the Final Completion of the project the General Contractor shall prepare one 3 ring binder titled with the name of the project and date. The binder shall contain, in order, the following:

1. The General Contractor’s name, address, telephone number, fax number and the name of the project manager or contact person representing the General Contractor, including addresses and telephone numbers where that person can be reached for emergency service at all times including nights, weekends, and holidays.
2. The names, addresses, telephone numbers for each major subcontractors including:
   a. Plumbing sub-contractor
   b. Mechanical sub-contractor
   c. Electrical sub-contractor
   d. Roofing sub-contractor
3. When applicable evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
   a. Certificates of Inspection for Plumbing, Mechanical and Electrical.
   b. Certificates of Occupancy.
4. Certificates of Insurance for products and completed operations.
5. Evidence of payment and release of liens.


7. In order of division, following the order of the sections of this specification, all warranty information specifically required by the sections of this specification.

8. In order of division, following the order of the sections of this specification, catalogs, wiring and control diagrams, manufacturer's data, maintenance and operation instructions, parts lists on all devices, fixtures, machines, appliances, mechanical and electrical equipment, etc., for permanent maintenance records.

1.4 RECORD DOCUMENTS

A. Throughout progress of the work, the contractor shall maintain an accurate record of actual construction and changes of the contract documents.

B. The purpose of the Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of the work to proceed without lengthy and expensive site measurement, investigation, and examination.

C. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications as to actual products used and each sheet of drawings and other documents where such entry is required to show the change properly.

D. Accuracy of records shall be such that future search for items shown in the Contract Documents may rely reasonably on information obtained from the Project Record Documents.

E. The Record Documents shall be made available to the Architect/Engineer for review upon request, and the Architect's approval of the current status of Project Record Documents may be a prerequisite to the Architect's/Engineer approval of requests for progress payment and request for final payment under the contract.

F. Record Document Handling:

1. Maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the work.

2. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

G. Content: Promptly following receipt of the Owner's Notice to Proceed, secure from the Architect at no charge to the contractor one complete set of all documents comprising the contract. Immediately upon receipt of the job set described in Paragraph 2.01(A) above, identify each of the Documents with the title, "RECORD DOCUMENTS - JOB SET". Maintain at site for Owner one Record Copy of:
1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to Contract
5. Architect/Engineer Field Orders or written instructions
6. Approved shop drawings, product data and samples
7. Field Test Reports

H. Making entries on Drawings:

1. Using an erasable colored pencil, clearly describe the change by note or drawing.
2. Call attention to the entry by a "cloud" drawn around the area or areas affected.
3. In the event of overlapping changes use different colors for the overlapping changes.
4. Legibly mark drawings to record actual construction such as:
   a. Depths of various elements of foundation in relation to finish first floor datum.
   b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   c. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the structure.
   d. Field changes of dimension and detail.
   e. Changes made by Field Order or by Change Order.
   f. Details not on original contract drawings.

I. Make entries in the specifications, addenda and other pertinent documents by legibly marking each section to record the manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed. Indicate changes made by Field Order or by Change Order.

J. Show on the job set of Record Drawings, by dimension accurate to within one inch, the centerline, etc., of each run of items such as are described above. Clearly identify the item by accurate note such as "cast iron drain", "galv. water", and the like. Show, by symbol or note, the vertical location of the item ("under slab", "in ceiling plenum", "exposed", and the like).

K. At Contract closeout, deliver Record Documents to Architect/Engineer for Owner. Accompany this submittal with a transmittal letter in duplicate containing:

1. Date
2. Project title, and commission number
3. Contractor's name and address
4. Title and number of each Record Document
5. Signature of contractor or his authorized representative

END OF SECTION 01 78 00
SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Throughout progress of the Work of this Contract, maintain an accurate record of all changes in the Contract Documents, as described in Article 3.01 below.

B. Upon completion of the Work of this Contract, transfer the recorded changes to a set of Record Documents, as described in Article 3.02 below.

1.2 RELATED WORK DESCRIBED ELSEWHERE

A. Submittals: Section 01 33 00

1.3 QUALITY ASSURANCE

A. General: Delegate the responsibility for maintenance of Record Documents to one person on the Contractor’s staff as approved in advance by the Owner.

B. Accuracy of records: Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to properly show the change. Accuracy of records shall be such that future search for items shown in the contract Documents may reasonably rely on information obtained from the approved Record Documents.

C. Timing of entries: Make all entries within 24 hours after receipt of information.

1.4 SUBMITTALS

A. The Owner’s approval of the current status of Record Documents will be a prerequisite to the approval of requests for progress payment and request for final inspection and final payment under the Contract.

1.5 PRODUCT HANDLING

A. Use all means necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure data to the Owner’s approval; such means include, if necessary in the opinion of the Owner, removal and replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the Contract Documents at no cost to the Owner.
PART 2 PRODUCTS

2.1 RECORD DOCUMENTS

A. Job Set: Promptly following award of contract, secure from the Owner, at no charge to the contractor, one complete set of all Documents comprising the Contract.

B. Final Record Documents: At a time near the completion of the Work, but prior to final inspection and final payment, secure from the Owner at no charge to the Contractor, one complete set of all Drawings included in the Contract.

PART 3 EXECUTION

3.1 MAINTENANCE OF JOB SET

A. Identification: Immediately upon receipt of the job set described in Paragraph 2.01 above, identify each of the Documents with the title “RECORD DOCUMENTS - JOB SET.” Maintain the following on site:
   • Drawings
   • Specifications
   • Addenda
   • Change Orders and other Modifications to Contract
   • Architect/Engineer Field Orders or written instructions
   • Field Test Reports

B. Preservation:
   1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Owner.
   2. Do not use the job set for any purpose except entry of new data and for review by the Owner, until start of transfer of data to final Record Documents.
   3. Maintain the job set at the site of Work as the Architect designates that site.

C. Making entries on Drawings:
   1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic line, as required. Date all entries. Call attention to the entry by a “cloud” around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

D. Making entries on other Documents:
   1. Where directives issued by the Owner cause changes, clearly indicate the change by note in ink, colored pencil, or rubber stamp.
2. When changes are caused by Contractor originated proposals approved by the Owner, including inadvertent errors by the Contractor which have been accepted by the Owner, clearly indicate the change by note in erasable colored pencil.

3. Make entries in the specifications, addenda and other pertinent documents by legibly marking each section to record the manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed. Indicate changes made by Field Order or by Change Order.

4. Make entries in the pertinent Documents as approved by the Owner.

E. Conversion of schematic layouts:

1. In most cases on the Drawings, arrangements of conduits and circuits, piping, duct, and other similar items, is shown schematically and is not intended to portray precise physical layout. The contractor, subject to the Owner’s approval determines final physical arrangement. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items that are shown only schematically on the Drawings.

2. Shown on the job set of Record Drawings, by dimension accurate to within 24 mm (1"), the center line of each run of items such as conduits and circuits, piping, duct, and other similar items. Clearly identify each item by accurate note. Show, by symbol or note, the vertical location of the item to indicate if it is under slab, in ceiling, exposed, etc. Make all identification sufficiently descriptive that it may be related reliably to the Specifications.

3. The Owner may waive the requirements for conversion of schematic data where, in the Owner’s judgment such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Owner.

4. Timing of entries: Be alert to changes in the Work from how it is shown in the Contract Documents. Promptly, and in no case later than 24 hours after the change has occurred and been made known to the Contractor, make the entry or entries required.

F. Accuracy of entries: Use all means necessary, including the proper tools for measurement, to determine actual locations of the installed items.

3.2 FINAL RECORD DOCUMENTS

A. General: The purpose of the final Record Documents is to provide factual information regarding all aspects of the Work, both concealed and visible, to enable future modification of design to proceed without lengthy and expensive site measurement, investigation, and examination. Provide a single bookmarked PDF file with bookmarks for each section and part. Provide 6 CD’s and 2 complete drawing sets of record drawings.

B. Approval of recorded data prior to transfer: Following receipt of the Final Record Documents described in Paragraph 2.01.B above, and prior to start of transfer of recorded data thereto, secure a review by the Engineer and Owner of all recorded data. Make all required revisions.

C. Approval of recorded data prior to transfer: Carefully transfer all change data shown on the job set of Record Drawings to the Final Record Document. Coordinate the changes as required and clearly indicate at each affected detail and other drawing the actual location of items. Call attention to each entry by drawing a “cloud” around the area or areas affected. Make all change entries on the drawings neatly, consistently, and in ink or crisp black pencil.
D. Transfer of data to other Documents: If the Documents (other than Drawings) have been kept clean successfully during progress of the Work, and if entries have been sufficiently orderly thereon to the approval of the Engineer, the job set of those Documents (other than Drawings) will be accepted by the Owner as final Record Documents for those Documents. If any such document is not approved by the Engineer, secure a new copy of that Document from the Owner and carefully transfer the change data to the new copy.

E. Review and approval: Submit the completed total set of Record Documents to the Owner. Participate in review meeting(s) as required by Engineer or Owner. Make all required changes in the Record Documents and promptly deliver the final Record Documents to the Engineer prior to requesting a final inspection and final payment under the contract.

3.3 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor shall have no responsibility for recording changes in the Work subsequent to acceptance of the Work by the Owner, except for changes resulting from replacements, repairs, and alterations made by the Contractor as part of this guarantee.

END OF SECTION 01 78 39
SECTION 050520 - POST INSTALLED STRUCTURAL ANCHORS

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 the following:

1. Wedge anchors
2. Cartridge injection adhesive anchors

B. This specification section is only intended for use when specifically required by the drawings or other referencing specifications and structural applications. This section is not intended for use in non-structural applications or where not specifically referenced by the drawings or other specification sections.

C. Related Sections include the following:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Structural Steel Framing" for anchorage of structural steel.

1.3 PERFORMANCE REQUIREMENTS

A. Product substitutions must have capacities equal to or greater than values calculated for each specific condition calculated when calculated using the data in the referenced ESR report and in accordance with the appropriate design procedure and standards required by the building code. See requirements for substitution submittals.

1.4 DEFINITIONS

A. Post Installed Structural Anchors: Anchors supporting and/or anchoring structural elements of the building which are installed into hardened concrete or masonry and that are specified in the contract documents or performance based shop drawing design submittals for structural elements.

B. Wedge Anchors: A torque-controlled anchor, with an integral cone expander and single piece steel expansion clip providing 360-degree contact with the base material while not requiring
oversized holes for installation and an impact section to prevent thread damage with required nuts and washers.

C. Cartridge Injection Adhesive Anchors: An anchor system consisting of rod insert, nut, washer and a cartridge type, two-component polymer or hybrid mortar adhesive system dispensed and mixed through a static mixing nozzle supplied by the manufacturer.

1.5 SUBMITTALS

A. Product Data:
   1. Wedge Anchors
   2. Cartridge Injection Adhesive Anchors

B. Research/Evaluation Reports:
   1. Submit ICC reports for the following:
      a. Wedge Anchors
      b. Cartridge Injection Adhesive Anchors

C. Substitutions:
   1. Substitution requests may only be made using products with ICC-ESR reports for the product in the specific substrate.
   2. Substitution request shall include signed and sealed calculations demonstrating that the product is capable of providing equivalent performance of the specified product for each specific location and condition when calculated using the data in the referenced ESR report and in accordance with the appropriate design procedure and standards required by the building code.
   3. Substitution request shall specify the diameter and embedment depth of the substituted product
   4. Any increase in material cost resulting from the substitution shall be the responsibility of the contractor.

D. Manufacturer's Instruction: Manufacturer's Installation Instructions

E. Qualification Data: Submit installer qualification data as stated in Quality Assurance section. Qualifications shall be submitted in a letter format for each type of anchor to be installed, and shall include the following:
   1. The specific product to be used
   2. Complete description of installation procedure
   3. Personnel to be trained on anchor installation
   4. Date of Manufacturer training
   5. Manufacturer's training certificates or letter from manufacturer certifying training was complete with a list of individuals that were trained.
1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
   a. Coordinate meeting with individual preinstallation conferences for the following
   b. Structural Steel Framing
   c. Cold-Formed Metal Framing
   d. Rough Carpentry

B. Installer Qualifications: The installer shall be experienced in installing anchors equal to type, and into the substrate material required for this project

C. Installer Training: Conduct a thorough training session with the manufacturer's representative. Each individual responsible for the installation of anchors shall attend the training session. Training shall consist of a review of the complete process for the installation of the anchors and the use of proper equipment for drilling and installing the anchors, to include but not limited to:
   1. Hole drilling procedure. Clarify acceptability of rotary hammer drilling and/or core drilling.
   2. Hole drilling equipment
   3. Type and diameter of drill bits
   4. Hole preparation and hole cleaning technique
   5. Hole cleaning equipment
   6. Adhesive injection technique
   7. Adhesive injection equipment
   8. Anchor rod, nut and washer material requirements and associated cleaning requirements
   9. Anchor and Anchor rod installation
   10. Anchor tightening
   11. Adhesive curing requirements

D. Certifications: All anchors shall have an ICC ESR Evaluation report indicating conformance with the current applicable Acceptance Criteria for the building code applicable to the project.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Keep anchors, rod materials, nuts and washers in manufacturer's packaging with label intact until needed for use.

B. Keep anchors free of dirt and debris.

C. Store anchors in a clean dry area

D. Protect anchors from corrosion and deterioration.

E. Store anchors and adhesives in strict accordance with manufacturer's requirements.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Nuts: Having a proof load stress equal or greater than the minimum tensile strength of the associated anchor where type and strength is not specifically indicated by anchor or adhesive manufacturer.

B. Washers: Of type and material compatible with nuts unless specifically indicated by anchor or adhesive manufacturer.

C. Plate Washers: Provide ASTM A 36 plate washers of size and configuration specifically indicated.

2.2 CORROSION RESISTANCE

A. Anchors and Anchor Bodies

1. Uncoated Carbon Steel: Carbon steel anchors uncoated and free from oil, lubricants and other deleterious substances. Acceptable for use as follows:
   a. Interior dry conditions

2. Zinc Plated: Zinc plating in accordance with ASTM B633, Type III Fe/Zn 5 (SC1). Acceptable for use as follows:
   a. Interior dry conditions

3. Hot Dip Galvanized: Carbon steel anchors with hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
   a. Interior dry conditions
   b. Exterior conditions
   c. Anchoring galvanized steel elements

4. Stainless Steel: AISI Type 304 or 316 stainless steel and complying with ASTM F 593. Acceptable for use as follows:
   a. Anchoring treated lumber elements
   b. Anchoring stainless steel elements

B. Nuts

1. Uncoated carbon steel: Acceptable for use as follows:
   a. With Uncoated Anchors
2. **Hot Dip Galvanized**: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
   a. With Zinc Plated Anchors
   b. With Hot Dip Galvanized Anchors

3. **Stainless Steel**: ASTM F594. Acceptable for use as follows:
   a. With Stainless Steel Anchors

C. **Washers**
   1. Uncoated carbon steel: Acceptable for use as follows:
      a. With uncoated anchors
   2. **Hot Dip Galvanized**: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
      a. With Hot Dip Galvanized Nuts
   3. **Stainless Steel**: AISI Type 304 or 316 stainless steel. Acceptable for use as follows:
      a. With Stainless Steel Nuts

D. **Plate Washers**:
   1. Uncoated carbon steel: Acceptable for use as follows:
      a. With Uncoated Nuts
   2. **Hot Dip Galvanized**: Hot-dipped galvanized in accordance with ASTM A 153. Acceptable for use as follows:
      a. With Hot Dip Galvanized Nuts

2.3 **WEDGE ANCHORS**

A. Provide anchors with length identification markings conforming to ICC-ES AC01 or ICC-ES AC193.

B. **Size**: As indicated on drawings

C. **Embedment depth**: As indicated on the drawings but not less than the manufacturer’s documented minimum embedment depth. Where not specifically indicated use manufacturer’s minimum documented embedment depth.
1. Embedment depth is from surface of concrete or masonry. Anchor lengths and extent of threads shall account for embedment depth, connected elements, plate washers, washers, nut and appropriate stick thru.

D. Concrete Anchors:

1. Anchors shall be tested in accordance with ACI 355.2 and the most recent issue of ICC-ES AC193 including the following:
   a. All mandatory testing
   b. Shear and tension in cracked concrete.
   c. Critical and minimum edge distances and spacing

2. Anchors design shall be in accordance with ACI 318 Appendix D

3. Where not specifically indicated otherwise in contract documents or approved performance based shop drawings submittal anchors shall be as follows:
   a. Hilti Kwik Bolt TZ with nut and washer, of required finish, ICC ESR-1917
   b. Power – Stud+ SD2 Wedge Anchor with nut and washer, of required finish, ICC ESR-2502
   c. Simpson Strong Bolt 2 with nut and washer, of required finish, ICC ESR-3037
   d. Approved equal (See substitution requirements)

2.4 CARTRIDGE INJECTION ADHESIVE ANCHORS

A. Provide anchors with length identification markings conforming to ICC-ES AC58 or ICC-ES AC308.

B. Size: As indicated on drawings

C. Embedment depth: As indicated on the drawings but not less than the manufacturer’s documented minimum embedment depth. Where not specifically indicated use manufacturer’s minimum documented embedment depth.

   1. Embedment depth is from surface of concrete or masonry. Anchor lengths and extent of threads shall account for embedment depth, connected elements, plate washers, washers, nut and appropriate stick thru.

D. Adhesive: Two component system complying with ASTM C-881 Type I and IV, Grade 3, Class A, B and C

E. Concrete Anchors:

   1. Anchors shall be tested in accordance with the most recent issue of ICC-ES AC308 including the following:
      a. All mandatory testing
      b. Shear and tension in cracked concrete.
c. Critical and minimum edge distances and spacing

2. Anchors design shall be in accordance with ACI 318 Appendix D as amended by the specific design provisions of ICC-ES AC308

3. Where not specifically indicated otherwise in contract documents or approved performance based shop drawings submittal anchors shall be as follows:

   a. HAS-E Standard or HAS SS rods, washers, and nuts of required finish with Hilti HIT RE 500-SD Adhesive Anchorage System for anchorage to concrete, ICC ESR-2322.


   c. A36 threaded rods, cleaned and degreased, washers, and nuts of required finish with Simpson Strong Tie Set-XP Adhesive Anchorage System for anchorage to concrete, ICC ESR-2508.

   d. Approved equal (See substitution requirements)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

   1. Proceed with installation only after unsatisfactory conditions have been corrected.

   2. Installation constitutes acceptance of existing conditions and responsibility of satisfactory performance.

3.2 INSTALLATION, GENERAL

A. Where manufacturer recommends the use of special tools for installation of anchors, such tools shall be used.

B. Match mark and drill, match drill or use other methods to ensure anchors are properly located.

C. Do not adjust anchor location after installation. Coordinate with EOR for modifications to connected element where anchors are incorrectly located.

D. Drill holes perpendicular to substrate surface.

E. Drill holes with rotary impact hammer drills using carbide-tipped bits or core drills using diamond core bits as indicated in the ICC-ESR report.

F. Drill bits and core bits shall be of diameters indicated in the ICC-ESR report.
G. All holes shall be cleaned with compressed air to remove all drilling dust and other deleterious substances.

H. Remove water from holes to attain a surface dry condition unless specifically permitted otherwise by ICC-ESR report.

I. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

J. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and telecommunications conduit, and gas lines.

K. Perform anchor installation in strict accordance with manufacturer instructions and ICC-ES report.

L. Anchors shall be installed perpendicular to the substrate face within plus or minus 5 degrees unless specifically permitted otherwise by ICC-ESR report.

M. Install plate washers where specifically indicated or where connected elements have oversized holes.

N. Install a round washer under nuts. Round washers are in addition to plate washers where plate washers are required.

3.3 WEDGE ANCHORS

A. Protect threads from damage during anchor installation.

B. Set anchors to manufacturer’s recommended torque, using a torque wrench. Following attainment of 10% of the specified torque, 100% of the specified torque shall be reached within 7 or fewer complete turns of the nut. If the specified torque is not achieved within the required number of turns, the anchor shall be removed and replaced unless otherwise directed by the Engineer.

3.4 CARTRIDGE INJECTION ADHESIVE ANCHORS

A. Clean all holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive.

B. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

C. Follow manufacturer recommendations to ensure proper mixing of adhesive components.
D. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface.

E. Remove excess adhesive from the surface.

F. Shim anchors with suitable device to center the anchor in the hole.

G. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

H. Observe manufacturer recommendations with respect to installation temperatures.

3.5 FIELD QUALITY CONTROL

A. Testing and Inspection: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports in accordance with the schedule of special inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Remove and replace misplaced or malfunctioning anchors. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout. Anchors that fail to meet proof load or installation torque requirements shall be regarded as malfunctioning.

B. Galvanizing Repairs: Prepare and repair damaged galvanized coatings with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

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

END OF SECTION 050520
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Structural steel.
   2. Bearing Plates

B. Products furnished, but not installed under this Section:
   1. Anchor rods and embed plates indicated to be built into masonry, installed under Division 04 Section "Unit Masonry".
   2. Anchor rods and embed plates indicated to be cast into cast-in-place concrete, installed under Division 03 Section "Cast-in-place-Concrete"

C. Related Sections:
   1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
   2. Division 05 Section "Post Installed Structural Anchors" for wedge, and adhesive anchors

1.3 DEFINITIONS

A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges" and as modified herein.

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:
   1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
   2. Welded built-up members with plates thicker than 2 inches.
   3. Column base plates thicker than 2 inches.

1.4 PERFORMANCE REQUIREMENTS
A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using AISC 360.
2. Use LRFD; data are given at factored-load level.
3. All bolted connections for bracing members shall be designed and fabricated as slip critical connections to allow for field reaming of holes to address fit up issues.
4. All bolted connections for axial loaded members shall be designed and fabricated as slip critical connection to allow for field reaming of holes to address fit up issues.
5. The minimum number of bolts for any connection shall be two.
6. All steel to steel connections shall extend at least two thirds of the depth of the supported member being connected.

B. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360

1.5 SUBMITTALS

A. Product Data:

1. Nonshrink grout.
2. Post installed structural anchors: See specification section 050520

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings showing plan location and elevation of all embedded items.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
5. Include scale drawings of all gusset plates.
6. Provide minimum 1/4” thick cap plates at the ends of all exposed HSS members, and at the top of all HSS columns.
7. Equally space filler beams or joists between columns and/or other dimensioned beams unless noted otherwise.
8. Identify members and connections of the seismic-load-resisting system.
9. Indicate locations and dimensions of protected zones.
10. Identify demand critical welds.

C. Delegated-Design Submittal:
1. For structural steel connections indicated to comply with design loads provide structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
   
a. Each individual calculation shall be clearly labeled in coordination with erection drawings such that it identifies the member(s) that the connection applies to.

2. Professional Engineer's Statement: A written statement indicating that the for fabrication shop drawings incorporate all the connection requirements included in the calculations submitted for approval inclusive of any corrections required in response to shop drawing review comments. The statement shall be prepared by, and signed and sealed by the professional engineer that completed the calculations submittal.

D. Slip Critical Bolt Installation Statement: A written statement indicating the means and equipment to be used to achieve the tightening requirements for clip critical bolt installation. Statement shall identify the specific pre-installation required by the special inspections and acknowledge that this testing must be coordinated and completed prior to commencement of erection.

E. As-built anchor rod and embed survey

F. Welding certificates
   
   1. Submit welding certificates for all individuals expected to be performing field welding

G. Welding Procedure Specifications (WPS's) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each field welded joint whether prequalified or qualified by testing, including the following:
   
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.

H. Qualification Data:
   
   1. Fabricator
   2. Erector
   3. Post Installed Structural Anchor Installer

I. Research/Evaluation Reports:
   
   1. Post Installed Structural Anchors: See specification section 050520

J. Product Test Reports: For the following:

K. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.

C. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category SBD (Conventional Steel Building Structures)

D. Fabricator Responsibility

1. The structural steel fabricator shall be responsible for enlisting the Steel Joist fabricator as a direct subcontractor.
2. The structural steel fabricator shall be responsible for enlisting the Cold Formed Steel Purlin fabricator as a direct subcontractor.
3. The structural steel fabricator shall be responsible for enlisting the steel erector as a direct subcontractor.

E. Structural Steel and Architectural Structural Steel Installer Qualifications: The erector shall be experienced in installing structural steel equal in material, design and scope to the structural steel required for this project.

F. Post Installed Structural Anchor Installer: See specification section 050520 for requirements

G. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

H. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

I. Preinstallation Conference: Conduct conference at Project site.

1. Review special inspection and testing and inspecting agency procedures for field quality control.
2. Review items requiring special inspection and testing that must be tested and inspected prior to installation of decking, concrete slabs, or other items that might limit access to the item to be tested or inspected.
3. Review welding requirements.
4. Review electrode storage requirements.
5. Review pre-construction bolt installation verification.
6. Review bolt installation calibration requirements.
1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes and Tees: ASTM A 992.

B. Channels, Angles-Shapes:

1. ASTM A 36 unless noted otherwise
2. ASTM A 572/A 572M, Grade 50 where indicated.

C. Plate and Bar:

1. ASTM A 36 unless noted otherwise
2. ASTM A 572/A 572M, Grade 50 where indicated.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

1. Square or Rectangular HSS: Fy=46 KSI
2. Round HSS: Fy=42 KSI

E. Welding Electrodes: Comply with AWS requirements.
1. All weld filler metal shall meet the requirements of H16 as tested in accordance with AWS A4.3 per AISC 341-05 Appendix W.
2. All weld filler metal shall have a minimum CVN toughness of 20 ft-lbs at 0 degrees Fahrenheit.
3. Demand Critical Welds: All weld filler metal shall have a minimum CVN toughness of 20 ft-lbs at minus 10 degrees Fahrenheit per AWS and 40 ft-lbs at 70 degrees Fahrenheit per AISC 341-05 Appendix X.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish:
   a. Plain for primed or painted steel

2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type.
   a. Finish:
      1) Plain for unprimed steel or steel receiving standard shop primer.
      2) Mechanically deposited zinc coating, ASTM B 695, Class 50 for hot galvanized steel or steel to receive high performance top coating.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish:
   a. Plain for primed or painted steel

2. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type.
   a. Finish:
      1) Plain for unprimed steel or steel receiving standard shop primer.
      2) Mechanically deposited zinc coating, ASTM B 695, Class 50 for hot galvanized steel or steel to receive high performance top coating.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy hex or round head steel structural bolts with splined ends; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish:
1) Plain for unprimed steel or steel receiving standard shop primer.
2) Mechanically deposited zinc coating, ASTM B 695, Class 50 for hot galvanized steel or steel to receive high performance top coating.

D. Post Installed Structural Anchors: See specification section 055020 for products

2.3 PAINT

A. Galvanizing Repair Paint: ASTM A 780.

2.4 NONSHRINK GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS
A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

   1. Joint Type:
      a. Snug tightened unless noted otherwise
      b. Slip critical as indicated and for all members of the SLRS.

B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
   2. Remove backing bars and runoff tabs, back gouge, and grind steel smooth.

2.7 CLEANING Cleaning:

   1. Clean and prepare steel surfaces that are to remain unprimed according to SSPC-SP 2, "Hand Tool Cleaning."
   2. Clean and prepare steel surfaces that are to receive standard primer according to SSPC-SP 3, "Power Tool Cleaning."
   3. Clean and prepare steel surfaces that are to receive special primer according to the associated painting specification. When not specifically noted the minimum cleaning shall be SSPC-SP 6, "Commercial Blast Cleaning."

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

   1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
   2. Galvanize loose and hung lintels, shelf angles, all exposed exterior steel and all steel located in exterior masonry walls unless noted otherwise. Coordinate with drawings and specifications.

      a. Galvanized elements to be top coated shall not be quenched, and shall be swept blast to ensure proper adhesion of top coats.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections
B. All source quality control shall be completed by the fabricator’s personnel unless noted otherwise and shall be in accordance with the certified fabricator’s quality control manual, AISC Code of Standard Practice, and AWS D1.1.

C. Testing Agency: Fabricator will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports as required.

D. Special inspections are not required at the source of fabrication based on the requirement for an AISC certified fabricator.

E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

F. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

G. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M.

H. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
   1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
   2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
      1. Prepare a certified as-built survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

   B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION
   A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION
   A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

1. Where ungrouted anchor rod sleeves are required caulk the annular surface between the sleeve and the anchor rod to prevent grout from entering the sleeves.
2. Set plates for structural members on wedges, shims, or setting nuts as required.
3. Weld plate washers to top of baseplate as indicated.
4. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
5. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
   a. Use grout forms and grout surcharging as required to ensure that grout completely fills the space below bearing or base plate, and no voids remain.
6. Paint base plates, anchor bolts and sections of columns below grade and below finished floor with Coal Tar Mastic Paint.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.

G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

1. For slip crtical connections enlarge hole to next standard hole size and provide next standard bolt size.

I. Pour stops and edge angles: Pour stops and edge angles shall be field installed based on global building control lines to ensure overall building geometry is maintained.

1. Do not located based on local member geometry.
3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: As indicated on shop drawings.

B. Finger Tight Bolts: All joints noted as finger tight shall be hand tightened as required to install elements. Do not tighten by mechanical means.

1. Provide jam nuts to prevent nut from backing off.
2. After initial tightening turn nut and jam nut in opposite direction to bind them against one another.

C. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars and/or runoff tabs at all exposed locations and at all members and connections of the SLRS, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

D. Post Installed Structural Anchors: See specification section 055020 for products

3.5 FIELD PAINTING

A. Column bases: Paint column bases below grade and/or below finished floor with coal tar mastic paint.

B. Field painting of structural steel for finished appearance in exposed conditions or for high performance coating systems is specified in Division 09 painting sections.

3.6 FIELD QUALITY CONTROL

A. Testing and Inspection: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports in accordance with the schedule of special inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION
A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

B. Touchup Painting: At all exterior and exposed interior conditions promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
2. Apply a primer of same type as shop primer used on adjacent surfaces. Coordinate with Part 2 priming requirements

END OF SECTION 051200
PART 1 GENERAL

1.1 SPECIAL NOTES
A. Work under this section of the specifications shall be governed by requirements there under.
B. The use of the word "PROVIDE" in the specifications and on drawings for work under this section shall mean: Furnish and install complete, supplying all necessary labor and materials.
C. This section applies to all sections of Division 23 of this project except as specified otherwise in the individual sections and here-in. Work described in this section includes general requirements common to all mechanical systems. Provisions of this section apply to all mechanical specification sections.
D. References: Refer to the General Conditions for the Contract, the Supplementary General Conditions for the Contract, and the Subdivisions of Division 1; all of which are contained in or referenced as a part of this Project Manual. Instructions relating to the overall operations of the Contractor, as they may apply and as contained in the referenced Subdivisions, will be equally applicable to his subcontractors, equipment and material suppliers and/or installers, and other persons or companies having work requirements, this project.

1.2 GENERAL REQUIREMENTS
A. Provide necessary labor, material, plant and equipment including materials not specifically mentioned, but necessary to complete the job in neat, correct and workmanlike manner.
B. The drawings and specifications shall be considered as supplementary, one to the other, so that materials and labor indicated, called for or implied by the one and not the other, shall be supplied and installed as though specifically called for by both.
C. All electrical equipment shall be UL listed and all gas equipment is to be AGA certified.
D. All items shall be properly lubricated and in perfect operation upon completion of the project and prior to final acceptance by owner.
E. Contractor shall be held responsible for having visited job site and having familiarized himself with existing conditions prior to submitting bid. If any existing problems are identified, notify Architect in writing prior to submitting bid.

1.3 SCOPE
A. Refer to Section 011000 for a detailed description of the project scope.
1.4 SPACE CONDITIONS

A. All work shall fit the spaces available. Verify all dimensions of the work before commencing fabrication and/or installation. Minor deviations from the drawings required to conform to space conditions and to provide the required accessibility shall be made at no additional cost to Owner.

B. Only base manufacturer's equipment has been investigated and determined to meet necessary space conditions. It shall be the responsibility of the approved equal manufacturer and contractor to verify their suitability for use on this project.

1.5 DRAWINGS

A. The Plans are not intended to show all ductwork, pipes, valves, fittings, connections, and details of the work to be done. The piping, duct, and equipment locations shall be adhered to as closely as possible; however, any changes necessary to avoid columns, beams, lighting fixtures, ductwork, sprinkler piping, etc., shall be made at no additional cost to the Owner.

B. Conflicts in the plans and specifications where changes and alterations are necessary, or where exceptions are taken by the Contractor with regard to sizes, locations, and other details indicated on the drawings, they shall be discussed with the Architect and have his consent in writing before any changes are made. The Contractor shall confer with the Architect for the exact location of all openings into finished areas and all equipment and piping locations before proceeding with the work.

C. The drawings of this work were prepared in conjunction with the other trades and plans of the project and it shall be the Contractor's responsibility to provide himself with drawings of the other trades as required and to coordinate and schedule the work with the other trades.

D. Should any difficulties prevent the installation of the work as indicated, the proposed changes shall be submitted to the Architect in detail and must be approved in writing before the work may be performed.

E. All inverts, locations, and elevations on all piping, equipment, trenches, etc. shall be verified on the job site prior to the performance of any work that may be affected in any manner by said inverts, locations, and elevations. Before construction of project starts, check location of proposed equipment and ductwork. Review other drawings for project, checking locations of structural elements, locations and sizes of chases, type and method of construction of roof, ceilings, walls, and partitions. Report to Architect and Engineers before start of construction any conflicts or unsatisfactory conditions. In no case shall Contractor proceed in uncertainty. No extra charge will be approved after start of construction for work resulting from failure to follow these instructions.

F. Where connections and drains are provided to serve specific pieces of equipment, it shall be the Contractor's responsibility to verify the exact location of the equipment connections and drains and no installation shall be attempted until exact locations have been established. This applies to all equipment regardless of who furnishes said equipment.
1.6 PERMITS, LICENSES, AND FEES

A. The installation of the systems covered by these specifications shall conform in strict accordance to all ordinances, codes and regulations of the State and DHEC and shall conform to all applicable requirements and recommendations of the N.F.P.A. These requirements are the minimum and shall be complied with at no additional cost to the Owner.

B. In the absence of local regulation and codes, on heating, ventilating, or air conditioning, or in items or circumstances not covered by local regulation and codes, all recommendations and requirements of ASHRAE, as set forth in the current editions of the applicable ASHRAE Guides, shall be met as well as all requirements and recommendations of NFPA 90A and the International Building Code.

C. Where requirements of the drawings and specifications exceed code requirements, the work shall be provided in accordance with the drawings and specifications. Any work provided contrary to these requirements shall be removed and replaced at the Contractor's expense.

1.7 BID BASIS

A. Basis of Design: The design is based on equipment data furnished by a listed "Base" manufacturer. Only this base listed equipment has been verified by the A/E for compliance with the documents. There is no intent in these documents to necessarily use only "standard" products of the "Base" supplier nor any other supplier. Modifications and alterations of standard products may be required.

1.8 MATERIALS AND WORKMANSHIP

A. All materials and equipment shall be new and free from flaws and defects of any nature. Materials called for are to be considered as standard of quality; which however, implies no right on part of Contractor to substitute other materials and methods without written authority from Architect.

B. All work shall be performed by skilled mechanics, under competent supervision, employing latest and best practices of the trade. Work shall be installed in accordance with recommendations of ASHRAE Guide, and equipment manufacturer's installation instructions. In the event there is any conflict or doubt, consult Architect for clarification and approval.

1.9 SUBSTITUTIONS

A. Specific reference in the specifications to any article, device, product, material, fixture, form or type of construction, etc., by name, make, or catalog number, with or without the words "or equal" shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition, and the Contractor in such cases may at his option, use any article, device, product, material, fixture, form or type of construction, which in the judgement of the Architect, expressed in writing prior to bidding as specified below, is equal to that herein named.
B. Requests for written approval to substitute materials or equipment considered by the Contractor as equal to those specified, shall be submitted for approval to the Architect ten days before bids are taken. Requests shall be accompanied by samples, descriptive literature, and engineering information, as necessary to fully identify and appraise the product. No increase in the contract sum will be considered when requests are not approved. If the item is found to be equal, the Architect will issue an Addendum making it a part of the Contract Documents prior to bidding. After bidding, no further changes will be considered.

C. Contractor shall be responsible for determining that all products submitted for approval meet given space limitations and maintain all required clearances for proper access and service.

D. Being listed as an approved equal manufacturer means only that the listed manufacturer is basically a reputable supplier whose equipment will receive consideration if in accordance with all document requirements including space limitations and deliver. Being listed is not to be construed as indicating or implying that the supplier's product is assured of being acceptable for the project. The burden of developing a product to comply with the documents and of obtaining approval of the product rests solely with the Contractor.

1.10 SUBMITTAL

A. The Engineer will review and take appropriate action on shop drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be for general compliance with the design and with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. Engineer's review shall be conducted with reasonable promptness consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Engineer shall not be required to review and shall not be responsible for any deviation from the Contract Documents not clearly noted by the Contractor, nor shall the Engineer be required to review partial submissions or those for which submissions for correlated items have not been made.

B. Prior to submittal of shop drawings to the Engineer, the General Contractor and the Mechanical Contractor shall review and approve shop drawings. Shop drawings which have not been reviewed and approved in writing by the Mechanical Subcontractor will not be reviewed by the Engineer. Mechanical Contractor shall state in writing on shop drawings, any proposed deviations from contract documents. Such deviations, if not stated in shop drawing submittals, shall be the sole responsibility of the Mechanical Subcontractor. Note: In addition to the General Contractor's approval and stamp, the first page of each shop drawing submittal must contain the words "APPROVED" or "APPROVED AS NOTED" and must be signed and dated by the Mechanical Subcontractor before the Engineer will review them.

C. Review rendered on shop drawings shall not be considered as a guarantee of measurements of building conditions. Where drawings are reviewed, said review does not mean that drawings have been checked in detail; said review does not in any way relieve this contractor from his responsibility or necessity of furnishing material or performing work as required by the contract drawings and specifications.
D. After award of Contract, and before any materials of this Section are delivered to the job site, submit an electronic copy of shop drawings to Engineer in accordance with the requirements listed below and in accordance with the provisions of these Specifications and the General Conditions of the Contract.

1. After securing tentative approval on all items pending shop drawing submission, the contractor shall submit for approval the manufacturer's shop drawings of all equipment, and shop drawings to scale of all fabricated work furnished under this Section of the specifications including piping, ductwork, equipment layouts, supports and equipment foundation pad layout. Shop drawings shall be of scale large enough to clearly indicate all details of work. Mechanical rooms, boiler rooms, refrigeration plants, and fan rooms shall be submitted on a scale of not less than 1/4-inch equals one foot.

2. Where colors or finishes are specified for products, a sample showing the color or finish shall be submitted with the shop drawings.

3. Where high efficiency motors have been specified, submit certification of motor efficiency with shop drawings for each motor of one horsepower or greater.

E. Material List: Accompanying the shop drawings, submit a complete list of all materials proposed to be furnished and installed under this Section, giving manufacturer's name and catalog number, sizes, capacities, model numbers, accessories and other pertinent information for each item to indicate full compliance with drawings and specifications; this shall in no way be construed as permitting substitution except as specifically provided in the Architectural Section of these specifications. Every device or piece of equipment herein specified by model and manufacturer shall be submitted for approval. Partial lists submitted from time-to-time will not be permitted.

F. Mechanical/Electrical Coordination: Before equipment is ordered and after all motors, loads, controls, and other characteristics of equipment are known, the Contractor shall review the data shown on the Electrical drawings. Special attention shall be given to motor size, starters, means of disconnect, control wiring, etc. that are being furnished under the electrical section of the specifications. At the time of shop drawing submittal, the contractor shall by letter to the Engineer point out any discrepancies and describe the proposed corrective action.

1. Prior to start of construction, contractor shall submit a starter schedule for review by Engineers. This schedule shall contain equipment description, starter manufacturer and model number, starter accessories, control voltage and source of starter power and control circuitry.

2. No extra charge will be approved after start of construction for work resulting from failure of contractor to follow these instructions.

G. As-Built Drawings: Contractor shall maintain on the job site one complete set of the mechanical drawings for this project. All changes authorized by the Architect as to the location, sizes, etc., of piping, ductwork, and other mechanical equipment shall be indicated in red ink on the mechanical drawings as the work progresses. At the completion of the project, Contractor shall deliver a complete set of "As-Built" prints of the mechanical drawings to the Architect.
H. Control Drawings:

1. Before installation of controls, submit twelve (12) copies of complete submittal data, including equipment specifications, control diagrams, schematic diagrams, internal connections, and sequence of operation to the Architect for his approval. Diagrams shall show all instruments, devices, tubing, etc. Set points and actions of instruments, operating ranges, and normal position of controlled devices shall be indicated. Operating sequence describing each system shall appear on the same drawing as the system's control diagram.

2. Wiring diagrams shall show conduit and wire sizes, transformers, fuses and correct schematic diagrams for each motor starter and magnetic contractor. Diagram shall be coordinated with the equipment manufacturers involved and shall show the terminal designations for all connections to the equipment and the manufacturer's approval obtained.

I. Manual: Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Owner through the Architect two copies each of a Manual compiled in accordance with the provisions of the Architectural Section of these specifications; and also include in each copy of the Manual a copy of the As-Built Drawings, operating and maintenance instructions, approved control drawings, spare parts lists, name and address of local service representatives and all warranty certificates for new equipment.

1.11 ELECTRIC WORK

A. Electrical Contractor will provide the following for the mechanical equipment:

1. A source of power as required for each electric motor and for each electrical heating and cooling item of equipment installed under the mechanical contract, including final wiring connections to motor terminals or to terminals in a control panel mounted on each respective unit.

2. Circuit breaker protection as required for each electric heating and cooling item of equipment installed under the mechanical contract.

3. Wiring each electric motor and each electrical heating and cooling item of equipment (where applicable) through a magnetic starter or a magnetic contactor furnished by the Mechanical Contractor.

4. Wiring each constant speed ceiling exhaust fan through a wall switch furnished by the Electrical contractor.

B. All motors shall be provided with thermal overload protection either internally or at the starter and all electrical equipment shall be U.L. listed.

C. In the event Mechanical Contractor proposes to use any items of mechanical equipment which have sizes, numbers of electrical meters, or other electrical requirements different from those specified on schedules, drawing or elsewhere, Contractor shall be responsible for coordinating these changes with the Electrical Contractor and he shall reimburse the Electrical Contractor for all additional costs necessitated by these changes.
D. In general, the Electrical Contractor will do all power wiring for the mechanical equipment as described above, and the Mechanical Contractor shall do all control and interlock wiring, unless otherwise specified or indicated on drawings.

E. Consult electrical drawings for extent of electrical work provided for the mechanical equipment. Verify current characteristics with Electrical Contractor before ordering any equipment for this project.

F. Mechanical Contractor shall provide all other wiring not covered above, that is necessary for complete and operating heating and air conditioning systems for the building, including all control wiring, interlock wiring, conduit, relays, controls, starters, disconnect switches, circuit breakers, control conduit and outlet boxes, wiring of all applicable control items of equipment, and other electrical work as required.

G. All wiring shall be run in galvanized or sherardized rigid electrical conduit or E.M.T. where allowed under the electrical section of the specifications, and shall be concealed in finished areas and occupied spaces. All conduit shall be attached to ceiling or walls, attachment to or suspension from other equipment will not be permitted. If routing of conduit is questionable, verify routing with Engineers before proceeding with installation. NO PLENUM RATED CABLE WILL BE ALLOWED ON THIS PROJECT.

H. The Mechanical Contractor shall provide power wiring from the breaker panel to all control devices including but not limited to control panels, valves, thermostats, dampers, flow switches and other devices requiring power for a complete and operating mechanical system.

I. All electrical work required under this Contract shall comply with the National Electrical Code, and shall meet all local requirements. All electric equipment shall bear UL labels.

1.12 GUARANTEES

A. In addition to the warranty and guarantees under the General Conditions of the contract the Contractor agrees:

1. To correct defects in workmanship, new materials, new equipment, and the operation of system for a period of one year from date of acceptance. Equipment and materials, repaired or replaced are guaranteed for one year following date of correction.

2. To repair any damage to building and equipment resulting from defects in workmanship, materials, equipment, and system operation.

3. To remove any item not specified or given approval and replace it with specified or approved item.

4. Any item submitted for approval that does not conform to these specifications shall have accompanying note of exception.

5. That the system as installed shall comply with code requirements.
PART 2 PRODUCTS

2.1 EQUIPMENT AND MATERIALS

A. All equipment and materials provided under this section of the specifications shall be new and of the best grade and quality. Materials and equipment manufactured outside of the United States will not be acceptable.

B. The approval of the Architect shall be obtained by the Contractor on all equipment and materials before any installation is made.

C. Equipment that is installed and then does not perform as represented by selection data or shop drawings shall be replaced with equipment that meets the job requirements and specifications at no additional cost to the Owner.

D. All equipment, materials, and work indicated on the drawings or as specified hereinafter is intended to be installed in a manner conforming to the best engineering practices and all equipment is intended to be complete in every respect to satisfy the job requirements and this specification. In the event any material or equipment is indicated to be used or installed contrary to the manufacturer's recommendations, or if any part, control accessory or auxiliary item required for satisfactory and proper operation and performance of the material and/or equipment is not indicated or specified, it shall be the Contractor's responsibility to notify the Architect in writing prior to installation. In the event the Contractor fails to give such notice, he will be required to correct the work and/or furnish items omitted (in the performance of his work) at no increase in the contract sum.

E. Upon request from the Architect, the Contractor shall furnish to the Architect a certification on all materials and equipment so designated by the Architect. The certification shall be made by the manufacturer of the material and/or equipment; shall be signed by an official of the manufacturing concern; and shall state that the drawings, specifications, and project requirements have been thoroughly studied by the manufacturer and that the proposed material and/or equipment is unconditionally guaranteed to operate and/or perform properly as applied.

PART 3 EXECUTION

3.1 UTILITY CONNECTION AND MODIFICATIONS

A. It shall be the Contractor's responsibility to determine all requirements regarding utility services to the building. The Contractor shall verify the exact locations of stubs provided.
3.2 PROTECTION

A. The Contractor shall provide adequate protection to all materials, equipments, fixtures, etc. provided under this section of the specifications to prevent damage of any nature. The Contractor shall be required to remove and replace, at no additional cost to Owner, any item showing any sign of damage of any nature that cannot be restored to its new condition and appearance. Grinding and polishing may be used in the restoration of damaged equipment and materials when approved by the Architect.

3.3 EXCAVATION AND BACKFILLING

A. Contractor shall do all excavating and backfilling for installation of work included under this contract and he shall promptly remove from the premises all excess earth, debris, and trash for which he is responsible. Contractor shall be responsible for coordinating cutting and patching excavation conditions with Owner and Utilities prior to execution of any excavation work. All work shall comply with section 230500 as well as the General Conditions section of these specifications.

3.4 CUTTING AND PATCHING

A. The Contractor will do all cutting and patching and construction of chases within building for this installation.

3.5 PENETRATIONS AND CURBING

A. Contractor shall provide framed openings in roof and walls as required for exhaust fans and louvers. Contractor shall coordinate sizes and locations of these and all other necessary penetrations well in advance.

B. Contractor shall provide all roof curbs for this installation and will flash all roof curbs and penetrations as detailed on drawings.

3.6 MECHANICAL - ELECTRICAL COORDINATION

A. Mechanical equipment, piping, and ductwork shall be installed with clearances to electrical switchboards, panel boards, power panels, motor control centers, and transformers. The clearances shall be the greater of the requirements of the latest editions of the NEC or a minimum of 3'-6" in front of the equipment which ever is greater. Equipment, ductwork or piping shall not be installed directly over the electrical gear and not less than 3'-0" horizontally from the top of the electrical gear.
3.7 OPERATING AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall acquaint and instruct the Owner's representative with all details of performance, operation, and maintenance of the systems. In addition, the contractor shall furnish two copies of a brochure to the Owner through the Architect, which shall contain printed operating and maintenance instructions, parts list, control diagram, etc., including a list of spare parts and any special tools recommended by the equipment manufacturers to be stocked by the Owner. The manuals shall include a complete set of all approved shop drawings furnished under this section of the specifications.

B. The basis of Owner's instructions shall be written for inclusion in the maintenance and operating instructions data specified above. Obtain certificates, signed by the Owner's representative, that these instructions have been received and understood.

3.8 CLEANING

A. The Contractor shall keep the job site clean, removing all debris and unused material as they occur. At the completion of the work, the Contractor shall thoroughly clean all materials and equipment provided as part of the work.

B. Prior to testing and adjusting, all new piping systems, including all components of systems, shall be thoroughly cleaned inside and out.

C. All piping shall be chemically cleaned prior to final filling and connection to air handlers.

D. Painting of the mechanical equipment shall be as specified under other sections of the work. Removing loose scale, rust, drippings, dirt, etc. in preparation for painting shall be done under this section of the specifications.

E. Prior to acceptance of the building, thoroughly clean all exposed portions of the HVAC installation, removing all labels and all traces of foreign substances, using only a cleaning solution approved by the manufacturer of the item being cleaned. Caution should be taken to avoid damage to all finished surfaces.

3.9 START-UP

A. The Contractor shall place the systems in full operation before testing begins. Contractor shall make corrections in the system, including furnishing and installing drives, motors, dampers, valves, etc., if required to balance the systems. All such corrections shall be included in the Contractor's base bid and shall be accomplished at no additional cost to the Owner. All piping shall be tested before covered with insulation or being concealed.

END OF SECTION 23 02 00
SECTION 23 03 00 - PRESSURE TESTING

PART 1 GENERAL

1.1 DESCRIPTION

A. The work in this section includes the pressure testing of all air conditioning systems and includes requirements common to all the mechanical systems. Provide all labor, tools instruments, etc. as required to completely test the systems.

B. Other sections of these specifications are a part of this section. Refer to all other sections for a complete description of the work. Work, conditions, and materials specified in other sections and not duplicated in this section includes, but is not limited to the following:

1. Mechanical General Provisions
2. Basic Materials and Methods
3. Refrigeration
4. Adjusting Balancing HVAC Systems

C. All work provided under these specifications shall be subject to constant inspection and final approval of the Architect and all Code authorities having jurisdiction. Tests, in addition to these specified herein, required to prove Code compliance shall be provided as required by the Authorities without additional cost to the Owner. All work found to be defective or indicating leakage shall be repaired or replaced with new materials, as directed by the Architect. Tests shall be repeated until all work is proven tight.

1.2 QUALITY CONTROL

A. All tests shall be conducted by qualified personnel. When requested the qualifications of individuals shall be submitted to the Architect for approval.

1.3 NOTIFICATION

A. The Architect/Engineer shall be notified prior to all tests.

B. The Code Authorities having jurisdiction shall be notified prior to all tests.

PART 2 PRODUCTS

2.1 PROVIDING EQUIPMENT

A. Provide all material, test equipment, instruments, and labor required for the tests. All instruments shall be properly calibrated and shall have records on calibration.
PART 3 EXECUTION

3.1 PIPE TEST

A. All water piping shall be proven tight by a hydrostatic pressure test of 1-1/2 times the normal working pressure of the system, but in no case less than 200 psig for a period of not less than 24 hours. The piping shall hold the pressure without change except that change due to temperature change. This test is to be witnessed by Engineer and Owner.

3.2 EQUIPMENT TEST

A. Equipment in the piping system shall be subjected to hydrostatic pressure tests equal to the maximum non-shock working pressure of the equipment and shall hold the pressure for not less than 4 hours.

END OF SECTION 23 03 00
SECTION 23 05 00 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.1 DESCRIPTION

A. Work described in this section includes construction materials and methods of installing equipment common to all mechanical systems. Provisions of the section apply to all mechanical specifications sections.

PART 2 PRODUCTS AND METHODS

2.1 FLASHING

A. Ductwork and HVAC Equipment: Cap flashing for all ducts and other types of ventilating equipment which pass through or mount on the roof shall be furnished and installed under this section of the specifications. The material shall be of the same materials as the ducts, etc. to which it shall be fastened unless otherwise noted. The cap flashing shall be made tight to the duct, waterproofed, and extended over the base flashing and down the side for not less than 4 inches. The cap flashing shall be formed to provide a spring action against the base flashings. In cases of dissimilar metals between the cap and base flashings, an isolation membrane shall be installed to prevent electrolysis.

B. Flashing for pipes passing through the roof shall be provided as indicated on the drawings or as approved by the Architect.

2.2 PIPE SLEEVES

A. All pipes passing through walls, floors, ceilings, all fire rated partitions, etc. shall be provided with pipe sleeves made of galvanized steel pipe unless specifically noted otherwise. Sleeves through partitions and walls shall be of the same length as the wall thickness. Sleeves set in concrete slabs shall be set flush with the underside of the slab and shall extend 1/2 inch above the finish on top of the slab. Where sleeves are in fire rated construction, the voids between the sleeves and the piping passing through insulated piping shall be of sufficient size to allow insulation to pass through the sleeve freely. Where pipes pass through walls below grade or through any floor slabs, the space between the pipe and sleeve shall be finished caulked water tight with G.E. Silicone caulking.

B. At the Contractor's option sleeves 8 inches in diameter and larger may be formed of 16 gauge galvanized steel with welded butt joints. The metal finish shall be restored after welding.
2.3 FIRESTOPPING MATERIALS

A. Where pipe, ducts, conduit, wiring, or other mechanical equipment passes through fire rated walls, floors, or partitions with ratings of one-hour or greater, firestopping materials shall be placed in the voids between the equipment and the rated building material. Sleeves in rated construction shall have voids between sleeves and duct or pipe filled with firestopping materials.

B. Firestopping Materials shall have a fire rating equal to or greater than the construction penetrated. Firestopping material shall not produce toxic smoke when exposed to flame. Firestopping shall be unaffected by vibration, normal usage, and shall not deteriorate with time.

C. Firestopping materials shall be Chase-Foam as manufactured by Chase Technology Corp. or Silicone RTV Foam (3-6548 Silicone) as manufactured by Dow Corning or 3M "CP-25" caulk system. Where permitted by Code, fire rated mineral wool may be used for applications approved by the Architect. All firestopping systems shall be installed in strict compliance with manufacturer's instructions for compliance with UL listings.

D. Firestopping in the mechanical room [and elevator machine room] shall be recessed 3/4-inch on both sides and shall be sealed on both sides with 3/4-inch of acoustical sealant.

2.4 PENETRATIONS AND CURBING

A. General Contractor shall provide framed openings in roof and walls as required for exhaust fans and louvers. Mechanical Contractor shall coordinate with General Contractor and provide General Contractor with sizes and locations of these and all other necessary penetrations well in advance. Failure to do so will result in Mechanical Contractor bearing cost of this phase of the work.

B. Mechanical Contractor shall provide all roof curbs for this installation and General Contractor will flash all roof curbs and penetrations as detailed on drawings.

C. Mechanical Contractor shall provide all roof equipment support rails for this installation and General Contractor will flash all support rails and penetrations as detailed on drawings.

D. Curbs shall be welded galvanized steel construction minimum 18 ga. with wood nailer, 1-1/2" rigid insulation on interior, counter flashing cap, and damper shelf as required. Unless specified elsewhere curbs shall be a minimum of 12" high with interior dimensions as required by unit dimensions. Curbs shall be Creative Metals, Inc. Series CSSF, Conn-Fab, or approved equal. Curbs shall be compatible roof system. Verify roof construction and pitch prior to ordering curbs. Provisions shall be made within curbing penetrations for routing of power wiring and control wiring to equipment to prevent the necessity of a second roof penetration for this purpose.
E. Equipment Support Rails shall be welded galvanized steel construction minimum 18 ga. with wood nailer, 1-1/2" rigid insulation on interior, counter flashing cap, and damper shelf as required. Unless specified elsewhere curbs shall be a minimum of 12" high with interior dimensions as required by unit dimensions. Curbs shall be Creative Metals, Inc. Series ESSSF, Conn-Fab, or approved equal. Support Rails shall be compatible roof system. Verify roof construction and pitch prior to ordering rails.

F. Where walls are penetrated for louvers, ducts, or vents, appropriate lintels shall be provided to support structure and shall comply with the requirements of the structural drawings and specifications.

2.5 FLOOR, WALL AND CEILING PLATES

A. General:

1. Where exposed to view, all piping or duct passing through or into floors, walls, partitions, and ceilings shall be provided with escutcheon plates of flanges. The Plates or flanges shall fit snugly around the pipe, or the pipe insulation for insulated lines, and shall cover completely the pipe opening and sleeves. Plates shall be fabricated of minimum 16 gauge galvanneal as appropriate to allow field painting. All plates shall be painted to match surrounding finish.

B. Unfinished Areas:

1. In unfinished areas, the plates or flanges shall be constructed of not less than 16 gauge galvanized sheet metal. Equipment rooms with furred ceilings will be considered as unfinished areas.

2.6 ACCESS PANELS

A. Access panels shall be provided for access to all equipment, valves, piping, dampers, etc. furnished under this section of the specifications and requiring access. Dampers with operating control through the ceiling will not require access. The panels shall be located as indicated on the drawings and/or as required for adequate access. The exact locations of the access panels shall be as approved by the Architect.

B. Walls and ceilings: Contractor shall furnish and install steel doors in sidewalls, in walls of chases, in accessible chases, and other locations as indicated or required for ready access to service valves, balancing valves, automatic air vents, balancing dampers, and other items as applicable. Access doors shall be a minimum of 24" x 24" in size where applicable, and shall be furnished with screwdriver operated cam lock doors and a gray prime coat finish. Access doors shall have the same fire rating as the walls, floors, or ceilings in which they are installed. Access doors shall be Miami-Carey Co. Model HP and (as applicable) or approved equal.

C. All panels located in fire rated walls or partitions shall be 1-1/2 hour B rated doors.
D. Ductwork: Furnish and install steel access doors where indicated and/or required for access to motor operated dampers, controls, filters, louvers, fire dampers, and any other operable devices. Access doors shall be minimum 18" x 18" in size and shall be fabricated of minimum 24 gauge galvanized steel hinged to a fastening device to give an air tight closure on neoprene or felt gasket. Doors for insulated duct shall be double panel construction with 1" rigid insulation material between metal panels. Access doors shall be Ruskin AD-1275, Series ADH-22 or approved equal.

E. Suppliers of Comparable Products: Krueger, Miami-Carey, Ruskin.

2.7 PAINTING

A. All factory applied finishes on equipment and materials that are damaged in any fashion shall be restored to their original finish in a manner as approved by the Architect.

B. Where the interior of any duct is exposed to view or can reflect light as viewed from a habitable space the interior surfaces shall be primed and painted flat black or as otherwise approved by the Architect.

C. Where colors or finishes are specified in this section of the specifications to match adjacent surfaces and the colors or finishes of the product installed do not match the contractor shall repaint or refinish as required to accomplish the desired effect, as approved by the Architect.

D. All finish painting shall be performed under another section of the specification, except as specified otherwise in this section of the specification.

E. Mechanical Contractor shall paint all exposed piping, both insulated and uninsulated that is installed under his contract. Refer to Architectural Section and piping specifications for painting specifications.

2.8 EXCAVATION AND BACKFILLING

A. The Contractor shall carefully plan the excavations to avoid existing trees and plants and shall not approach too close to footings and foundation. Exact locations of excavations to be approved by the Architect before performing work. The excavation shall be only wide and deep enough to provide for the piping, and other sub-grade construction. Shoring shall be provided and used when the ground and/or the depth of the excavation warrants same.

B. The piping shall rest on a continuous and firm grade. Holes shall be cut in the bottom of the excavation for pipe bells.

C. Where rock is encountered the rock shall be removed to a depth of 6" below the desired depth and replaced with suitable earth.
D. Backfilling shall be started only after the piping has been completed, tested and inspected. The backfill shall be free of rocks and debris and shall compacted as the excavation is filled. The Contractor shall take ample precaution to prevent damage to the piping. The compaction of the backfill shall be the same as the adjacent area as approved by the Architect, unless otherwise indicated.

2.9 OUTDOOR UNIT SUPPORTS

A. Units on roof: Mechanical Contractor shall provide equipment support rails for each outdoor unit located on roof. Equipment support rail shall be as specified here-in. Mechanical Contractor shall coordinate with General Contractor on support rail placement to insure proper support and installation.

2.10 STRUCTURAL ATTACHMENTS

A. Concrete fasteners shall be self-drilling type, Locke Mfg. Co. "Bull Dog", Phillips "Red Head", or Diamond "Blue-Cut".

B. Mechanical Contractor shall provide all supplementary steel, framing members, beam clamps, hanger rods, etc., as required to properly support equipment and ductwork.

C. Hanger rods shall be selected to safely carry the load to be supported and shall not be less than the diameter listed by the hanger manufacturers for the specific size hanger used.

D. Attachment:

1. Piping and equipment suspended from steel construction shall be suspended from beams from the panel points of the bar joist only. When the hanger point is not directly below a structural member of a joist panel point, supplementary supporting steel shall be provided to receive the bridge across the structural member of a joist as required to receive the hanger. The hangers and supporting steel shall not be attached to the roof deck construction.

2. Hangers and supporting steel shall be attached to new concrete construction with continuous metal inserts designed to be used in ceilings, walls, or floors. In no case shall the load imposed on an insert exceed the manufacturer's recommended loading.

3. Hangers and supporting steel shall be attached to existing concrete structure, using concrete drill anchors at location and in a manner as approved by the Architect. Anchors shall not be loaded beyond their published ratings.

E. Support ducts from building structure with galvanized steel hangers to each side of duct. Hangers for ducts up to 60 inches maximum side dimension shall be 1" X 1/8" galvanized steel band. Hangers for larger ducts shall be 1-3/8" X 1/8" galvanized steel band. Space hangers on 8 foot centers with three hangers at each branch or take-off.

F. Steel pipe passing through a concrete slab on grade shall have modular expanding seals between pipe and sleeve. "Link-Seal" or an approved equal.
2.11 FOUNDATIONS, HANGERS, AND SUPPORTS

A. The Contractor shall provide all necessary hangers, supports, bracing, accessories, etc. required for proper installation of the work. Pipe hangers shall be spaced close enough to maintain proper grade and prevent sagging, but in no case shall the hanger spacing be greater than specified hereinafter. Special care shall be taken in supporting piping subject to expansion and contraction so that the piping does not become improperly aligned or anchored.

B. Unless specifically indicated otherwise, all concrete foundations and all structural steel, other than the building structure or special supports provided under another section of the specifications, required for proper support of piping, equipment, and materials provided under this section of the specifications and shall be furnished and installed under this section of the specifications and shall comply in strict accordance with all requirements of the Structural and/or Concrete Sections.

C. All supplementary steel exposed to the weather shall be hot-dipped galvanized.

D. Unless otherwise indicated, all floor mounted equipment located in the Equipment Room and spaces shall be mounted on 4" high concrete bases extending 6" beyond the bases of the equipment in each direction. Concrete shall be reinforced with No. 4 steel rods spaced 12" on center in both directions, except that steel in pump bases shall be on 6" centers.

E. Refer to Section 23 05 48 for seismic restraint requirements.

2.12 ELECTRICAL

A. All motors required for all equipment furnished under this section of the specifications shall be provided under this section of the work. Two speed motors shall be two winding type unless otherwise indicated. Unless otherwise indicated under the Electrical work or on the Mechanical Drawing, motors smaller than 1/2 HP shall be for 115 volts, single phase, 60 cycle power, and motors 1/2 HP and larger shall be single or three phase 60 cycle power as indicated on equipment schedules.

B. All motor starters, both manual and magnetic, and pushbutton stations required for motors furnished under this section of the specifications shall be provided under this section of the work unless specifically noted or indicated or otherwise in the Electrical section. All starters shall have "HAND-OFF-ON" switches and auxiliary contactors. Control transformers shall be provided as needed to meet control requirements. All two-speed starters shall be for two winding motors and shall have decelerating relay between high speed and low speed. All starters shall have compelling low speed start relay. All starters shall be installed under the Electrical Section of the specifications, unless furnished as an integral part of the equipment. All starters shall be of the same manufacturer as the starters furnished under the Electrical Section, except starters for water chillers may be of a different manufacturer. Coordinate with the Electrical Section.
C. Motors one horsepower and larger, including those used for pumps, air units, fans, etc. shall be designed in accordance with NEMA Standard MG1, Design B, Class B or F insulation for 40 degrees C temperature rise. The motor power factor at full load and rated voltage for motors with greater than 1 HP output shall be at least 0.85. Power factor shall be as determined by IEEE Standard 112A Method B. Apparent efficiency (Nominal Efficiency x Power Factory = Apparent Efficiency) shall meet or exceed the ASHRAE 90 energy standards.

D. All power wiring shall be provided under the Electrical Section of the specifications, unless specifically noted otherwise in this section of the work. Power wiring between starters and applied equipment motors shall be provided under the Electrical Section. Power wiring that is furnished under the Electrical Section to Packaged Equipment such as rooftop units, condensing units, electric heating equipment, packaged house pumping systems, etc. shall consist of a single point connection and shall terminate with the connection to the units shall be furnished as part of the package or shall be furnished under the Mechanical Section of the work.

E. All electrical devices and equipment including, but not limited to, all motors, starters, relays, pushbuttons, wiring, etc. provided under this section of the work shall comply in all respects with all requirements of the Electrical Section of the Specifications. Refer to the Electrical drawings for the project to determine the extent of Electrical wiring provided for support of Mechanical systems. All miscellaneous power wiring and all control wiring not indicated on Electrical drawings shall be provided by the Mechanical Contractor as part of Division 23 scope.

F. Identification labels shall be provided for each starter, control device, etc. showing the instruments function. Labels shall be in accordance with the requirements for labels as specified under the Electrical Section of the specifications.

G. All control wiring shall be provided under this section of the work, unless specifically indicated otherwise under the Electrical Section of the specifications.

H. Each manufacturer shall certify in writing to the Engineer that the equipment furnished has high efficiency motors as specified hereinbefore. The certification shall state motor HP, motor manufacturer, power factory and efficiency.
SECTION 23 05 03 - PIPE & PIPE FITTINGS

PART 1 GENERAL

1.1 The work under this section includes furnishing and installing all pipe and fittings required for the project.

1.2 Refer to other sections for all additional pipe and fittings specifications:
   A. Refrigerant Piping
   B. Valves
   C. Pressure Testing

PART 2 PRODUCTS

2.1 CHILLED WATER PIPING
   A. Piping: Unless otherwise indicated, shall be Schedules 40 black steel seamless or E.R.W. conforming to ASTM A-106 or A-53. Assemble piping 2" and smaller with 150 psig malleable iron screw fittings and piping larger than 2" with standard wall schedule 40 weld fittings or mechanical couplings. Underground piping shall be coated as hereinafter specified.
   B. Drains: Unless otherwise indicated, drains from mechanical equipment including unit condensate drains and equipment room drains shall be type "M" hard drawn copper tubing conforming to ASTM A-88, assembled using long radius pattern wrought copper solder fittings.
   C. Relief Valve Discharge Lines: Piping shall be the same as specified for the medium being relieved, unless otherwise indicated.

2.2 PIPE FITTINGS
   A. Copper Pipe: Wrought copper, solder type fittings, suitable for the temperature and pressures to be encountered and for the solder or brazing specified. Elbows shall be long radius pattern. Flare connections to equipment will be allowed only where required. Unions shall be Nibco No. 633 wrought copper with copper-to-copper solder joints or approved equal.
   B. Steel and Iron Alloy Pipe (Screw Fittings):
      1. Unless otherwise indicated, fittings shall be malleable iron in accordance with American Standard for Malleable Iron Screwed Fittings. Fittings shall be black or galvanized to match piping.
2. Eccentric reducing fittings shall be cast iron, black or galvanized to match piping. Screwed fittings used in drainage piping shall be cast iron, drainage pattern fittings.
3. Unions in steel alloy piping shall be Grinnell Fig. 463, ground joint bronze-to-iron-unions or approved equal.

C. Steel and Iron Alloy Pipe (Weld Fittings):
1. Fittings and rings shall be "Tube Turns", or approved equal by Taylor Forge or Ladish.
2. Steel butt fittings shall be in accordance with ASTM A-234 and ASA B16, Material A-106, Grade B. All elbows shall be long radius fittings.
3. Weldolet or Threadolet Fittings will be acceptable only when the branch size take-off is not less than two sizes smaller than the main run of pipe.
4. Unions shall be welding neck or slip-on companion flanges.

D. Steel Pipe (Mechanical Fittings): (Allowed above grade in mechanical room only)
1. Couplings shall be malleable iron for use with grooved and pipe, complete with bolts and gaskets. Gaskets shall be suitable for the temperature, pressures, and services to be encountered as recommended by the manufacturer for the specific installation. Couplings shall be Victaulic Style 77, Style HP 70 or Style HP 70 ES as indicated or approved equal.
2. Fittings shall be "Full-flow" design, fabricated of malleable iron, black or galvanized to match piping, and shall be grooved end.

E. SILVER SOLDER shall be Sil-Phos as manufactured by United Wire, or an approved equal high temperature solder.

F. GASKETS shall be as recommended by the manufacturer for the service, temperatures and pressures to be encountered.

G. Pipe Joints:
1. Copper Pipe & Tubing: Copper joints shall be made with a wire type solder applied in accordance with the manufacturer's recommendations. No paste solder or flux solder will be allowed. Copper joints underground, under floors on grade, or concealed in chases shall be brazed with silver solder. Copper joints exposed above the floors on grade or readily accessible above removable ceilings shall be made with 95-5 wire solder or brazed with silver solder. Connections of copper to ferrous piping or equipment shall be made with dielectric couplings and proper adapters. Solder joints at valves shall be made with 95-5 solder only. Flare connections to equipment will be allowed where required. Ends of all pipe and tubing shall be cut square and reamed smooth. Ends of tubing and pipe and cups of fittings shall be cleaned of oxides by mechanical means and lightly fluxed as soon as possible with a non-corrosive paste type flux. When inserting pipe or tubing into fitting, a slight twisting motion shall be applied to spread flux.
2. Steel and Iron Allow Piping: All piping connections to and near all coils and equipment, regardless of size, shall be screwed joints except when the equipment requires a flanged connection. Sufficient screwed fittings shall be provided near connection points to equipment to absorb piping movement without putting stress on equipment connection.
3. Screw Joints: Joints shall have American Standard tapered pipe threaded properly formed. Joint compound consisting of graphite and oil may be used in making up joints. Joint compounds containing lead or lead oxides shall not be used. All pipe shall be cut square, reamed, threaded and thoroughly cleaned before installation.

4. Welded Joints:
   a. All piping systems or portions of systems containing welded joints shall be constructed in accordance with all provisions and recommendations of ANSI B31.1, current edition, except as modified herein.
   b. Butt weld joints shall be complete full penetration welds made with a single vee, double vee, or other suitable type of groove, and shall be made with backing rings.
   c. The Contractor shall verify in writing to the Owner prior to construction that all welding procedures, welding operators and welders to be used on this project are qualified in accordance with Section IX of the ASME Boiler and Pressure Vessel Code, current edition.
   d. A copy of each welder's or welding operator's qualification record shall be filed in the job office.
   e. All welds shall be clean and shall be free of "icicles", loose metal or other obstructions that result from welding.
   f. The Architect reserves the right to require the Contractor to cut open the pipe along side of any welds for the purpose of inspection. In each case, the Owner will pay for such cutting and rewelding if the work is correct, but in case the inspected work is incorrect, the Contractor shall bear the cost of cutting, inspecting, and rewelding.
   g. The types and extent of non-destructive examinations required for pipe welds shall be in accordance with ANSI Code for Pressure Piping, B31.1 - Power Piping.

5. Mechanical Joints: Pipe ends shall be square cut and reamed of any burrs. Clean, sharp grooves shall be cut into pipe and the mechanical couplings and fittings shall be installed in strict accordance with the manufacturer's recommendations.

6. Gauge Ports: Gauge ports shall be .25 inch brass pipe

2.3 PIPE HANGERS AND SUPPORTS

A. The contractor shall furnish all labor, materials, equipment and incidentals and install pipe hangers, supports, concrete inserts, and anchor bolts including all metallic hanging and supporting devices for supporting exposed piping.

B. Hangers and supports shall be of approved standard design where possible and shall be adequate to maintain the supported load in proper position under all operating conditions. The minimum working factor of safety for pipe supports shall be five (5) times the ultimate strength of the support. All pipe and appurtenances connected to equipment shall be supported in such a manner as to prevent any strain being imposed on the equipment. When manufacturers have indicated requirements that piping loads shall not be transmitted to their equipment, the contractor shall submit a certification stating that such requirements have been complied with.

C. Submit to the Engineer for approval shop drawings of all items to be furnished under this section.
D. Submit to the Engineer samples of all materials specified herein if requested. All pipe and tubing shall be supported as required to prevent significant stresses in the pipe or tubing material, valves, and fittings and to support and secure the pipe in the intended position and alignment. All supports shall be designed to adequately secure the pipe against excessive dislocation due to thermal expansion and contraction, internal flow forces, and all probable external forces such as equipment, pipe and personnel contact.

E. All materials used in manufacturing hangers and supports shall be capable of meeting the respective ASTM Standard Specifications with regard to tests and physical and chemical properties, and be in accordance with MSS SP-58.

F. Hangers and supports shall be spaced in accordance with MSS SP-69 Table 3 as indicated below:

---

### Pipe Dimensions / MSS Allowable Spans

**Manufacturers Standardization Society (MSS)**

**Recommended Spans**

**Schedule 40 Steel Pipe**

<table>
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<tr>
<th>Nominal Pipe Size</th>
<th>Actual O.D.</th>
<th>Weight Per Ft. (lbs.)</th>
<th>Weight Per Ft. Fully Floated</th>
<th>Span Per MSS SP-69 Table 1</th>
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G. Pipe hangers and supports shall be as manufactured by B-Line Systems, Inc. or approved equal by PHD, Grinnell, or Fee and Mason. Any reference to a specific figure number of a specific manufacturer is for the purpose of establishing a type and quality of product shall not be considered as proprietary. Any item comparable in type, style, quality, design and performance will be considered for approval.
H. Hanger rods, nuts, and bolts shall be cadmium plated in mechanical rooms and elsewhere where exposed. Hardware concealed above ceilings may be standard black steel.

I. Supports outside of building shall be galvanized construction.

J. Pipe Hangers and Supports for Metal Pipe:

1. Suspended single pipes shall be supported by hangers suspended by steel rods from galvanized concrete inserts, beam clamps, or ceiling mounting bolts as follows:

K. Hangers:

1. All hangers and supports shall have some form of adjustment available after installation. Hanger material shall be compatible with the pipe material.
2. Hangers for steel pipe shall be B-Line Systems, Inc. figures B3100, B3102, B3170, and B3173 or approved equal. B-Line Systems, Inc. figures B3174 and B3198 or approved equal are acceptable for use on piping 2 inch and smaller.
3. Hangers for copper tubing shall be B-Line Systems, Inc. figures B3104CT, B3170CT, B3173CT, and B3198CT or approved equal. Felt isolator pads may be used on carbon steel hangers supporting stainless steel pipe or copper tubing.
4. Piping hangers shall be installed around the outside of the insulation with protective shields. Vapor barrier jackets shall not be broken by hanger rods.
5. Support long horizontal runs of insulated steel piping subject to 1/2" or more longitudinal thermal expansion with B-Line Systems, Inc., figures B3110 or B3114 roller hangers with a figure B3160 series protection saddle or approved equal. Cast iron rollers shall not be subjected to temperatures above 450°F.

L. Hanger Rods:

1. Hanger rods shall be B-Line Systems, Inc. figures B3205 and ATR or approved equal.
2. Hanger rods shall be subjected to tension only. Lateral and axial movement shall be accommodated by proper linkage in the rod assemble.
3. Hanger rod diameters shall be based on MSS SP-69 Table 4.

M. Concrete Inserts:

1. Concrete inserts for pipe hangers shall be continuous metal inserts designed to be used in ceilings, walls, or floors, spot inserts for individual pipe hangers and shall be as manufactured by B-Line Systems, Inc. or approved equal and shall be as follows:
   a. Continuous concrete inserts shall be used where applicable and shall be used for hanger rod sizes up to and including 3/4" diameter. Inserts to be used where supports are parallel to the main slab reinforcement shall be B221, B321, or B521 by B-Line Systems, Inc. or approved equal.
   b. Spot concrete inserts shall be used where applicable and shall be used for hanger sizes up to and including 7/8" diameter. Inserts shall be figures B2505 thru B2508, B2500, or B3014 by B-Line Systems, Inc. or approved equal.
N. Welded Steel Brackets:

1. Wall or column supported pipes shall be supported by welded steel brackets equal to B-Line Systems, Inc. figures B3063, B3066, and B3067 or approved equal as required for pipe sizes up to and including 20" diameter.

O. Stanchions:

1. Floor supported pipes 3" and larger in diameter shall be supported by either cast-in-place concrete supports or adjustable pipe saddle supports as directed by the Engineer. In general, concrete supports shall be used when lateral displacement of the pipes is probable (unless lateral support is provided), and adjustable pipe saddle type supports shall be used where lateral displacement of the pipes is not probable.

2. Each adjustable pipe saddle support shall be screwed or welded to the corresponding size base stand. Supporting pipe shall be of schedule 40 steel pipe construction. Each base stand shall be secured to the concrete floor by expansion bolts. Adjustable saddle supports shall be equal to B-Line Systems, Inc. figure B3093 with B3088T or B3090 with B3088 or approved equal.

P. Riser Clamps:

1. Riser piping shall be supported independently of any connected horizontal piping of possible. Provide supplementary steel or concrete supports for clamps. The clamps shall not be supported by the sleeves.

2. Support all vertical runs of ambient piping at each floor or as specified with B-Line Systems, Inc. figures B3373, B3131, B3373CT as required or approved equal.

Q. Pipe Clamps:

1. Where flexibility in the hanger assembly is required due to horizontal pipe movement, use pipe clamps. For non-insulated pipe use B-Line Systems, Inc. figures B3140 or B3142 or approved equal. For insulated pipe use B-Line Systems, Inc. figures B3144 or B3146 or approved equal.

R. Trapeze Hangers:

1. Strut channel trapeze hangers shall be used to support parallel piping. Pipe racks or stanchions fabricated with strut channel shall be used in areas of multiple pipe runs. Strut clamps, straps, and rollers will be used to maintain proper alignment. Strut shall be B22 or heavier as required as manufactured by B-Line systems, Inc. or approved equal. Clamps and straps shall be B2000 series or B2400 series by B-Line Systems, Inc. or approved equal. Rollers shall be B-Line Systems, Inc. figures B218, B219, B379, B479, or B3126 or approved equal.

S. Saddles:

1. Pipe covering protection saddles shall be used in conjunction with all insulated cold pipe lines. All saddles shall be centered on the piping and in the hangers.
2. Saddles for all insulated piping shall be galvanized sheet metal saddle shields of adequate size to cover the bottom 120 degrees of the pipe insulation. The shields shall be properly curved to evenly contact the outside circumference of the insulation and shall have rounded corners (1/2" radius). The length of the shields shall be as recommended by the pipe insulation manufacturer for the pipe size, insulation thickness and hanger spacing, but in shields shall be constructed of sheet metal of gauges not less than that listed below:

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<thead>
<tr>
<th>Pipe Size</th>
<th>Min. Gauge</th>
<th>Min. Length</th>
</tr>
</thead>
<tbody>
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<td>Up thru 3&quot;</td>
<td>18 gauge</td>
<td>12&quot; long</td>
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<tr>
<td>3-1/2 thru 5&quot;</td>
<td>16 gauge</td>
<td>16&quot; long</td>
</tr>
<tr>
<td>6&quot; and 8&quot;</td>
<td>14 gauge</td>
<td>20&quot; long</td>
</tr>
<tr>
<td>10&quot; and 12&quot;</td>
<td>12 gauge</td>
<td>24&quot; long</td>
</tr>
</tbody>
</table>

2.4 IDENTIFICATION OF PIPING

A. Label all piping in Equipment Rooms, above "Lay-In" type ceilings and all other accessible locations. Pipe markers shall conform with Scheme for Identification of Piping Systems (ANSI A13.1-1956).

B. Each marker shall show the name of the fluid in the pipe and a directional flow arrow, both superimposed on one of the five basic background colors. Pipe markers shall be installed at each service valve, at each mechanical item of equipment, at 20 foot intervals on horizontal runs of piping, and at midpoints of risers on vertical piping.

C. The identifiers shall be plastic strips on which the name of the service shall be printed. The identifiers shall be installed with an adhesive which will adhere to the pipe or insulation without deteriorating. Each piping system shall have a different color code marking. Colors shall be submitted for approval. Identification markers shall be applied over the insulation on insulated pipe. The identifiers shall be Brady or Seton self-sticking pipe markers and combination arrow tape meeting the requirements of ANSI standards. Where approved by Engineers stenciled labeling may be accepted.

PART 3 EXECUTION

3.1 PIPING shall be installed and connected to the equipment essentially as indicated on the drawings, in a neat and workmanlike manner. Unless specifically noted otherwise, all piping shall be concealed above ceilings and in chases.

3.2 ALL PIPING and equipment shall be supported by the building structure. Unless specifically noted otherwise, no piping or equipment shall be supported from ductwork, other piping, plenum construction or other equipment.
3.3 ALL PIPING shall be installed and arranged to allow free movement to the piping due to expansion, contraction, building movement, etc. without putting excessive stress or strain into the piping or equipment. All piping, risers, runouts, etc. subject to deflection by expansion and contraction shall be cold-sprung 50% of the deflection required to be absorbed. All sleeves and other openings in the construction shall be of sufficient size and spaced so as to allow for the necessary pipe movement without undue stress on piping. Risers shall be free to travel as required with the horizontal piping. Piping runouts to and from risers shall be absorbed and still maintain the specified pitch for the runouts and piping to and from the risers.

3.4 PIPING and equipment suspended from steel construction shall be suspended from beams or from the panel points of the bar joist only. When the hanger point is not directly below a structural member or a joist panel point, supplementary supporting steel shall be provided across the structural members or bridge joists as required to receive the hanger. The hangers and supporting steel shall not be attached to the roof deck construction.

3.5 ALL VERTICAL PIPING shall be installed plum and true. Horizontal piping specified to be graded shall be installed at a straight and uniform grade without pockets. Horizontal piping not specified to be graded, shall be installed in a straight and true manner.

3.6 ALL PIPING SYSTEMS shall be arranged to drain to one or more low points. Each low point shall be equipped with a hose and valve drain connection.

3.7 UNIONS and/or companion flanges shall be provided at all equipment connections and elsewhere as indicated on the drawings or as required for easy removal of equipment.

3.8 WATER PIPING

A. Piping shall be graded upward in the direction of flow not less than 1" per 40 feet. The runouts shall be graded in a manner to prevent the formation of air traps when the mains expand and contract. Reductions in pipe size shall be accomplished by an eccentric reducer with the flat side on top. Manual air vents shall be installed at the ends of mains, at all high points in the system, and elsewhere as indicated on the drawings. Runouts and branch lines shall be connected to the underside of mains unless indicated otherwise.

3.9 DRAINS

A. Condensate and equipment drains shall be graded downward in the direction of flow not less than 1/4" per foot. Unless otherwise indicated, the drains shall spill into floor drains, hub drains, or on grade in a manner as approved by the Architect.
3.10 RELIEF VALVE DISCHARGE LINES

A. Lines shall be installed to drain the entire relief line. Relief lines shall be supported in a manner to prevent any weight being placed on the relief valve. All relief lines shall have a plain section of pipe at the discharge point without threads.

3.11 FILLING, CLEANING, AND FLUSHING ALL WATER SYSTEMS

A. Prior to beginning chemical cleaning and final treatment, the Contractor shall notify the Engineer in writing 7 days in advance. A representative of the Engineering firm must be present for all cleaning and treatment. If Contractor performs work without notifying Engineer to allow a representative to be present and witness the cleaning, the procedure will not be accepted and will require recleaning in the presence of the Engineer.

B. All water systems shall be filled, flushed, and cleaned in strict accordance with equipment manufacturer's recommendations. Submit proposed chemical cleaning procedure to Engineer for approval prior to execution of this phase of work. Damage to equipment resulting from the use of improper cleaning and flushing methods shall be corrected at Mechanical Contractor’s expense. All systems shall be chemically cleaned prior to final fill and before any testing.

C. After final cleaning and flush, water samples shall be taken and analyzed by an independent laboratory. Based on the results of this analysis, the system shall be treated with a permanent corrosion inhibitor and neutralizing agent. After treatment more samples shall be taken and analyzed. This process shall be repeated as many times as necessary until an acceptable laboratory report is received. A copy of all reports shall be delivered to the Engineers for review prior to final acceptance of system.

D. As a minimum, the following steps shall be accomplished during cleaning of the closed loop system. These steps are considered the minimum required and may be modified based on recommendations of the chemical treatment company during the submittal phase of the project.

1. All flushing shall be a bleed and feed operation. No fill and drain cleaning will be acceptable.
2. All coil connections shall be piped together to prevent water from circulating through the coils until system is completely cleaned, flushed, and final chemical treatment is added.
3. The loop system shall be initially flushed with potable water for a period of not less than 24 hours, but as long as necessary to remove all loose debris from the system.
4. The initial chemical cleaning shall be accomplished with a chemical capable of dissolving and holding in suspension mill scale, rust, oils, and other substances commonly found in piping systems. During this phase of the cleaning process the loop water temperature shall be raised and maintained at 140°F.
5. After circulating the initial chemicals for the period recommended by the chemical treatment company, the system shall be flushed with potable water to remove all chemical and debris.
6. If necessary a neutralizing agent shall be added to the system in accordance with the chemical treatment manufacturer's recommendations.
7. Steps 4, 5, & 6 shall be repeated as many times as necessary to insure complete system cleaning.
9. Immediately after all chemical cleaning is complete, the permanent water treatment shall be added. The permanent treatment shall be designed to prevent corrosion, inhibit rust, and prevent microbiological and bacterial growth in the closed loop system.

3.12 PAINTING

A. All HVAC piping above grade shall be prime painted with two coats black Rustoleum. All piping exposed in mechanical rooms shall finished painted with one coat black enamel.

B. All gas piping above grade shall be painted with two coats black Rustoleum and finished with two coats green enamel. Gas service and pressure shall be stenciled in black on all lines at each regulator and at 20' intervals.

3.13 INSULATION

A. Insulate all piping as specified in Section 230700 of these specifications.

END OF SECTION 23 05 03
SECTION 23 05 23 - VALVES

PART 1 GENERAL

1.1 DESCRIPTION
A. The work under this section includes furnishing and installing all valves for the project. Provisions of this section apply to all mechanical specifications sections.

1.2 GENERAL REQUIREMENTS
A. Isolation valves shall be installed in the inlet and outlet connection to each chiller, chilled water coil, pump, and at all other equipment. All valves used for isolation service shall be ball valve or butterfly valves unless specifically noted otherwise.

B. All valves shall be suitable for the service for which they are installed and shall be fitted with proper seats, discs, packing, lubricants, etc. All gate, globe and angle valves shall have back seats for repacking under pressure. All valves shall be installed with the stem horizontal or above. Each valve shall be individually pressure tested on shell and seat. All valves shall be designed for not less than 150 psig service minimum.

C. Valves shall be Jenkins as specified hereinafter. Suppliers of comparable products are Crane, Kennedy, Walworth, Lunkenheimer, Milwaukee, Powell, Stockham, Nibco, and Hammond unless otherwise indicated.

D. Valves for mechanical systems shall be of the same manufacturer except specialty items.

PART 2 PRODUCTS

2.1 VALVES FOR WATER SERVICE (HVAC Systems)
A. Gate Valves: (Utilized on Steam system only)
1. Valves 2" and smaller shall be screw pattern, bronze body, union bonnet, rising stem, solid wedge, 200 psi W.W.F., Jenkins Fig. 47-U or approved equal.
2. Valves 2-1/2" and larger shall be flange pattern, iron body, O.S. & Y., composition disc, renewable bronze seat ring, 200 psi W.W.P., Jenkins Fig. 651-A or approved equal.
3. Valves, solder end of copper tubing 3" and smaller, bronze body, screw in bonnet, rising stem, solid wedge, 200 psig W.W.P. Jenkins 1242 or approved equal.
4. Gate Valves in water lines outside the building or underground shall be as follows and shall be installed with valve boxes.
5. Valves 2 inches and smaller shall be Jenkins No. 1240 with operating nut or approved equal.
6. Valves 2-1/2 inches and larger shall be Jenkins No. 325 with 2 inch square operating nut or approved equal.
7. Valves 2 inches through 3 inches may, at the Contractor's option, be Jenkins No. 1240 or approved equal.

B. Globe Valves:
   1. Valves 2-1/2" and larger shall be flange pattern, iron body, O.S. & Y., composition disc, renewable bronze seat ring, 200 psi W.W.P., Jenkins Fig 142 globe or approved equal.
   2. Valves, solder end for cooper tubing 3" and smaller, bronze body, screw in bonnet, renewable composition disc, 200 psi W.W.P., Jenkins Fig. 1200 or 1202 or approved equal.

C. Check Valves:
   1. Valves 2" and smaller, shall be screw pattern, bronze body, 45 degree regrinding swing check, renewable seat, 200 psi W.W.P., Jenkins Fig 92-A or approved equal.
   2. Valves 2-1/2" and larger shall be flange pattern, iron body, bronze trim, regrind-renew disc and seat ring, 200 psi, W.W.P., Jenkins Fig. 624 or approved equal.
   3. Valves, solder end for copper tubing 3" and smaller, bronze body, 45 degree regrinding bronze swing disc, 200 psi, W.W.P., Jenkins Fig. 1222 or approved equal.

D. Hose End Valves:
   1. Valves shall be Jenkins Fig. 372 bronze gate valves with standard garden hose threads and with caps and chains or approved equal or shall be gate valve with hose adaptor.

E. Butterfly Valves:
   1. At the Contractor's option butterfly valves may be used for isolation service in HVAC chilled water, hot water, or condenser water lines that are 2-1/2” and larger. Butterfly valves used for isolation at items of equipment shall have lug type body, drilled and tapped, so equipment connection can be removed without removal of valve or draining of lines. Single valves used for both balancing and isolation generally will not be allowed. Butterfly valves shall not be installed so close to other equipment that the wide open disc will touch any part of the equipment.
   2. Valves shall have cast iron bodies with bronze or ductile iron disc, stainless steel shaft and lock bolts, and shaft extension to clear 2-1/2" insulation minimum. The valve shall have a reinforced resilient line, non-collapsible and blow-out proof, or Buna or other suitable material, for the temperatures to be encountered and shall give bubble tight shutoff at not less than 175 psig working pressure. The valve shall be suitable for non-shock hydrostatic pressure test of 200 psig. The valves shall have 150 lbs. flanges or shall be for mounting between 150 lbs. flanges. Valves 2-1/2 through 6" small have manual lever operators. Valves 8" and larger shall have enclosed gear operators. Valves shall be Jenkins 220 or 230 series or approved equal. Suppliers of comparable products are Crane, Demco, Keystone, Mission, Muller, Norris, Powell and Centerline.
F. Silent Check Valves:

1. Silent check valves shall be installed at each water pump. The valves shall be center guided, spring loaded, non-slam low pressure drop type.
2. 2" and smaller, bronze body, screwed new, bronze trim, stainless steel spring, 200 psi W.W.P., Muller Steam Specialty Co. 203 BP or approved equal.
3. 2-1/2 through 10", semi steel body, wafer type, bronze trim, stainless steel spring, 125 psi W.W.P., Muller 101-AP or approved equal.
4. 12" and larger, semi steel body, globe type, bronze trim, stainless steel spring, 125 psi W.W.P., Muller 105-AP or approved equal.

2.2 STOP AND WASTE VALVES

A. Valves 2 inches and smaller shall be Grinnell No. E 2912 lever handle cocks or approved equal, except valves in piping underground shall be E 2892 Tee handle.

2.3 BALANCING COCKS

A. Cocks 1" size and smaller shall be bronze body, screw ends, angle or straightway union pattern, Sarco "Balance Master" suitable for tight shutoff and 200 psig W.W.P. or equal ball valve with memory stop by Appollo or NIBCO or approved equal.

B. Cocks 1-1/4" and larger shall be of the lubricated plug cock type, semi-steel., and suitable for a working pressure of 175 psig. The cocks shall be ACF Fig. R1430 screw pattern up through 2" size and shall be Fig. R-1431 flange pattern for sizes 2-1/2" and larger. Suppliers of comparable products are Nordstrom and Walworth.

2.4 BALANCING VALVES (Circuit Setters)

A. Balancing valves 3" and smaller shall be bronze body, screw ends, Teflon seats, stainless steel ball with precision machined orifice, and urethane packing. Valve shall be provided with a Schrader valve connection on each side of orifice for meter connection. Pressure rated 175 psi continuous duty and temperature rated 250 degrees F continuous duty.

B. Balancing valves 4" and larger shall be Semi Steel body, flange connection pattern, Teflon seats, stainless steel lubricated plug with precision machined orifice, and urethane packing. Valve shall be provided with a Schrader valve connection on each side of orifice for meter connection. Pressure rated 175 psi continuous duty and temperature rated 250 degrees F continuous duty.

C. Contractor shall provide one calibrated read out to Owner for future use with balancing valves.

D. Balancing valves shall be TACO Circuit Setter, GERAND Indicator ball valve, or approved equal.
2.5 BALL VALVES

A. Valves 2" and smaller shall be screw pattern, bronze body, 600 lb. WOG, Watts No. B-6000 or approved equal.
   1. Valves above grade shall be provided with standard lever handle, Durafil seats, and hardened chrome plated ball. Valves on insulated lines shall be provided with valve handle extension of sufficient length to allow handle operation above outer layer of insulation.
   2. Valves below grade shall be located in valve boxes and shall be provided with T-handle operator, stainless steel ball and stem, and mineral filled TFE seats and seals. Valves on insulated lines shall be provided with valve handle extension of sufficient length to allow handle operation above outer layer of insulation.

B. Valves 2-1/2" and larger shall be flanged pattern, Semi Steel body, 600 lb. WOG, Watts No. B-6000 or approved equal.
   1. Valves above grade shall be provided with standard lever handle, Durafil seats, and hardened chrome plated ball. Valves on insulated lines shall be provided with valve handle extension of sufficient length to allow handle operation above outer layer of insulation.
   2. Valves below grade shall be located in valve boxes and shall be provided with T-handle operator, stainless steel ball and stem, and mineral filled TFE seats and seals. Valves on insulated lines shall be provided with valve handle extension of sufficient length to allow handle operation above outer layer of insulation.

C. Suppliers of comparable products are Nibco, Smith, Apollo, Clayton, and Gemini.

PART 3 EXECUTION

3.1 ALL VALVES shall be installed as recommended by valve manufacturer.

3.2 ADEQUATE PRECAUTIONS shall be taken to protect sweat or weld valves during the sweating or welding process.

3.3 GATE VALVES shall not be used for isolation service on hot water or chilled water systems only full ported ball valves shall be used on these systems. All system isolation valves shall be either full ported ball valves or positive shutoff butterfly valves depending on pipe size.

END OF SECTION 23 05 23
SECTION 23 05 48 - VIBRATION ISOLATION AND SEISMIC RESTRAINT

PART 1 GENERAL

1.1 DESCRIPTION

A. The work in this section consists of furnishing engineering and materials necessary for vibration isolation and seismic restraints for equipment contained herein for the project.

B. All mechanical equipment 3/4 HP and over listed in the Vibration Isolation / Seismic schedule shall be mounted on vibration isolators to prevent the transmission of objectionable vibration and vibration induced sound to the building structure.

1. All isolation materials, flexible connectors and seismic restraints shall be of the same manufacturer and shall be selected and certified using published or factory certified data. Any variance or non-compliance with these specification requirements shall be corrected by the contractor in an approved manner at no cost to the Owner.

2. The contractor and manufacturer of the isolation and seismic equipment shall refer to the isolator and seismic restraint schedule that lists isolator types, isolator deflections and seismic restraint type. Vibration isolators shall be selected in accordance with the equipment, pipe or duct weight distribution so as to produce reasonably uniform deflections.

C. Install full line size flexible pipe connectors at the inlet and outlet of each pump, cooling tower, condenser, chiller, coiling connections and where shown on the drawings. All connectors shall be suitable for use at the temperature, pressure, and service encountered at the point of installation and operation. End fitting connectors shall conform to the pipe fitting schedule. Control rods or protective braid must be used to limit elongation to 3/8”. Flexible connectors shall not be required for suspended in-line pumps.

D. Unless otherwise specified, all mechanical, and plumbing equipment, pipe, and duct shall be restrained to resist seismic forces. Restraints shall maintain equipment, piping, and duct work in a captive position. Restraint devices shall be designed and selected to meet the seismic requirements as defined in the latest issue of the IBC or local jurisdiction building code.

1.2 SEISMIC RESTRAINT SHALL NOT BE REQUIRED FOR THE FOLLOWING:

A. Hanging, wall mounted, and flexibly supported mechanical, plumbing and components that weigh 20 pounds (89 N) or less, where \( I_p = 1.0 \) and flexible connections are provided between the components and associated duct work, piping and conduit.
B. Piping supported by individual clevis hangers where the distance, as measured from the top of the pipe to the supporting structure, is less than 12 inches (305mm) for the entire pipe run and the pipe can accommodate the expected deflections. Trapeze or double rod hangers where the distance from the top of the trapeze or support to the structure is less than 12 inches for the entire run. Hanger rods shall not be constructed in a manner that would subject the rod to bending moments (swivel, eye bolt, or vibration isolation hanger connection to structure).

C. High deformability piping (steel, copper, aluminum with welded, brazed, grooved, or screwed connections) designated as having an $I_p = 1.5$ and a nominal pipe size of 1 inch (25 mm) or less where provisions are made to protect the piping from impact or to avoid the impact of larger piping or other mechanical equipment. Note, any combination of piping supported on a trapeze where the total weight exceeds 10 lb/ft. must be braced.

D. High deformability piping (steel, copper, aluminum with welded, brazed, grooved, or screwed connections) and limited deformability piping (cast iron, FRP, PVC) designated with an $I_p = 1.0$ and a nominal pipe size of 1 inch and less in the mechanical equipment room, or 2” and less outside the mechanical equipment room.

E. PVC or other plastic or fiberglass vent piping.

F. HVAC ducts suspended from hangers that are 12 inches (305 mm) or less in length from the top of the duct to the supporting structure and the hangers are detailed to avoid significant bending of the hangers and their connections. Duct must be positively attached to hanger with minimum #10 screws within 2” from the top of the duct.

G. HVAC duct with an $I_p = 1.5$ that have a cross-section area less than 4 square feet. HVAC ducts with an $I_p = 1.0$ that have a cross sectional area of less than 6 square feet (0.557 m2).

H. Equipment items installed in-line with the duct system (e.g., fans, heat exchangers and humidifiers) with an operating weight less than 76 pounds (334 N). Equipment must be rigidly attached to duct at inlet and outlet.

1.3 MANUFACTURER’S RESPONSIBILITIES

A. Manufacturer of vibration and seismic control products shall have the following responsibilities:

1. Determine vibration isolation and seismic restraint sizes and locations.
2. Provide piping, ductwork and equipment isolation systems and seismic restraints as scheduled or specified.
3. Provide installation instructions and shop drawings for all materials supplied under this section of the specifications.
4. Provide calculations to determine restraint loads resulting from seismic forces presented in local building code or IBC, Chapter 16 latest edition. Seismic calculations shall be certified & stamped by an engineer in the employ of the seismic equipment manufacturer with a minimum 5 years experience and licensed in the project’s jurisdiction. Provide calculations for all floor or roof-mounted equipment, all suspended or wall mounted equipment 20lbs (89 N) or greater, and vibration isolated equipment 20lbs (89 N) or greater.
5. Seismic restraint load ratings must be certified and substantiated by testing or calculations under direct control of a registered professional engineer.
6. Calculations and restraint device submittal drawings shall specify anchor bolt type, embedment, concrete compressive strength, minimum spacing between anchors, and minimum distances of anchors from concrete edges. Concrete anchor locations shall not be near edges, stress joints, or an existing fracture. All bolts shall be ASTM A307 or better.

1.4 QUALITY CONTROL
A. The isolators and seismic restraint systems listed herein are as manufactured by Amber / Booth, Mason Industries, Kinetics, or approved equals which meet all the requirements of the specifications, are acceptable. Manufacturer must be a member of the Vibration Isolation and Seismic Control Manufacturers Association (VISCMA).
B. Steel components shall be cleaned and painted with industrial enamel. All nuts, bolts and washers shall be zinc-electroplated. Structural steel bases shall be thoroughly cleaned of welding slag and primed with zinc-chromate or metal etching primer.
C. All isolators, bases and seismic restraints exposed to the weather shall utilize cadmium-plated, epoxy coat or PVC coated springs and hot dipped galvanized steel components. Nuts, bolts and washers may be zinc-electroplated. Isolators for outdoor mounted equipment shall provide adequate restraint for the greater of either wind loads required by local codes or withstand a minimum of 30 lb. / sq. ft. applied to any exposed surface of the equipment.

1.5 SUBMITTALS
A. Submit shop drawings of all isolators, seismic restraints and calculations provided (para 1.03).
B. The manufacturer of vibration isolation products shall submit the following data for each piece of isolated equipment: clearly identified equipment tag, quantity and size of vibration isolators and seismic restraints for each piece of rotating isolated equipment. Submittals for mountings and hangers incorporating springs shall include spring diameter and free height, rated deflections, and solid load. Submittals for bases shall clearly identify locations for all mountings as well as all locations for attachment points of the equipment to the mounting base. Submittals shall include seismic calculations signed and checked by a qualified licensed engineer in the employ of the manufacturer of the vibration isolators. Catalog cut sheets and installation instructions shall be included for each type of isolation mounting or seismic restraint used on equipment being isolated.
C. Provide shop drawings indicating location of all specification SC cable restraints (section 2.03) required for pipe and ductwork. Drawings must be stamped by manufacturer’s registered professional engineer.
D. Mechanical, electrical and plumbing equipment manufacturers shall provide certification that their equipment is capable of resisting expected seismic loads without failure. Equipment manufacturers shall provide suitable attachment points and/or instructions for attaching seismic restraints.
PART 2 PRODUCTS

2.1 VIBRATION ISOLATORS

A. Specification W: A pad type mounting consisting of two layers of ribbed elastomeric pads with a ½” poro-elastic vibration absorptive material bonded between them. Pads shall be sized for approximate deflection of 0.10” to 0.18”. Pads shall be Amber / Booth Type NRC or approved equal.

B. Specification A: An elastomeric mounting having a steel baseplate with mounting holes and a threaded insert at the top of the mounting for attaching equipment. All metal parts shall be completely embedded in the elastomeric material. Mountings shall be designed for approximately 1/2” deflection, and incorporate a steel seismic snubber with all directional restraint. Mountings shall be Amber/Booth Type SRVD or approved equal.

C. Specification B: An adjustable, freestanding, open spring mounting with combination leveling and equipment fastening bolt. The spring shall be welded to the spring mounting baseplate and compression plate for stability. The isolator shall be designed for a minimum kx/ky (horizontal-to-vertical spring rate) of 1.0. An elastomeric pad having a minimum thickness of 1/4” shall be bonded to the baseplate. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. This type isolator must be used with specification SL seismic restraint (section 2.03). Isolators shall be Amber/Booth Type SW or approved equal.

D. Specification C: A unitized adjustable, stable open spring isolator with a seismic restraint housing which serves as a blocking device during equipment installation. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. The springs shall be designed for a minimum kx/ky (horizontal-to-vertical spring rate) of 1.0. Nuts, adjusting bolts and washers shall be zinc-electroplated to prevent corrosion. The spring assembly shall be removable with equipment in place and shall fit within a welded steel enclosure consisting of a top plate and rigid lower housing. Isolated seismic restraint bolts shall connect top plate to lower housing to resist seismic and wind forces in all directions and limit motion to a maximum of 1/4” movement before engaging. Surfaces that engage under seismic motion shall be cushioned with a resilient elastomeric pad or grommet to protect equipment. Top plate shall have adequate means for fastening to the equipment, and baseplate shall have adequate means for bolting to structure. Entire assembly shall be rated to exceed the applied seismic load (para 1.03). Seismic isolator shall be Amber/Booth Type CTER or approved equal.

E. Specification D: An elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment and an elastomeric isolation element designed for approximately 1/2” deflection. Hangers shall be Amber/Booth Type BRD or approved equal.

F. Specification E: A combination spring and elastomeric hanger consisting of a rectangular steel box capable of 200% minimum overload without visible deformation, 30 degree rod misalignment, coil spring, spring retainers and elastomeric element designed for approximately 1/2” deflection. The spring shall be designed for a minimum kx/ky (horizontal-to-vertical spring rate) of 1.0. Spring hangers shall be Amber/Booth Type BSRA or approved equal.
G. Specification F: A set (two or more) of spring thrust resisting assemblies, which consist of coil springs, spring retainer, isolation washer, angle mounting brackets, and elastomeric tubing for isolating thrust resister rod from fan discharge. Thrust restraints shall be Amber / Booth Type TRK or approved equal.

H. Specification SB: A unitized adjustable open spring isolator and a welded steel housing designed to resist seismic forces in all directions. Restraint surfaces which engage under seismic motion shall be cushioned with a resilient elastomer to protect equipment. Restraints shall allow a maximum of 1/4” movement before engaging and shall allow for the spring to be changed if required. Isolator shall be a stable spring with a minimum kx/ky of 1.0. The spring package shall include an elastomeric pad for high frequency absorption at the base of the spring. Nuts and bolts shall be zinc-electroplated to prevent corrosion. Bolting equipment to isolator with bolts smaller than main adjusting bolt will not be allowed. Baseplate shall provide means for bolting to the structure. Entire assembly shall be rated to exceed the applied seismic load (para 1.03.). Mountings shall be Amber/Booth Type SWSR or approved equal.

2.2 BASES

A. Specification G: A welded integral structural steel fan and motor base with NEMA standard motor slide rails and holes drilled to receive the fan and motor slide rails. The steel members shall be adequately sized to prevent distortion and misalignment of the drive, and specifically, shall be sized to limit deflection of the beam on the drive side to 0.05” due to starting torque. Snubbers to prevent excessive motion on starting or stopping shall be furnished if required; however, the snubbers shall not be engaged under steady running conditions. Bases shall be Amber/Booth Type SFB or approved equal.

B. Specification H: A welded WF (main member) structural steel base for increasing rigidity of equipment mounted thereon or for unitizing belt driven fans. Fan bases shall have holes drilled to match fan and located to provide required center distance between fan and supplied NEMA standard motor slide rails. The steel members shall have minimum depth of 1/12 of the longest span, but not less than 6” deep. Junior beams and junior channels shall not be used. Cross members shall be provided where necessary to support the equipment or to prevent twisting of the main members. Where height restrictions prevent the use of members having a depth of 1/12 of the longest span, beams of less depth may be used provided they have equal rigidity. Provide height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5” deflection or greater shall be of the precompression type to limit exposed bolt length. Bases shall be Amber/Booth Type WSB or approved equal.

C. Specification J: A concrete inertia base consisting of perimeter structural steel concrete pouring form (CPF), reinforcing bars welded in place, bolting templates with anchor bolts and height-saving brackets for side mounting of the isolators. Brackets for use with Specification type B isolators having 2.5” deflection or greater shall be of the precompression type to limit exposed bolt length. The perimeter steel members shall have a minimum depth of 1/12 of the longest span, but not less than 6” deep. The base shall be sized with a minimum overlap of 4” around the base of the equipment and, in the case of belt-driven equipment, 4” beyond the end of the drive shaft. Fan bases are to be supplied with NEMA standard motor slide rails. The bases for pumps shall be sized to support the suction elbow of end suction pumps and both the suction and discharge elbows of horizontal split-case pumps. The bases shall be T-shaped where necessary to conserve space. Inertia bases shall be Amber/Booth Type CPF or approved equal.
2.3 SEISMIC RESTRAINTS:

A. Specification SL: A restraint assembly for floor mounted equipment consisting of welded steel interlocking assemblies welded or bolted securely to the equipment or the equipment bases and to the supporting structure. Restraint assembly surfaces which engage under seismic motion shall be lined with a minimum ¼” thick resilient elastomeric pad to protect equipment. Restraints shall be field adjustable and be positioned for 1/4” clearance as required to prevent interference during normal operation. Restraint assembly shall have minimum rating of 2 times the catalog rating at 1 G as certified by independent laboratory test. Restraint shall be Amber/Booth Type ER or approved equal.

B. Specification SC: A restraint assembly for suspended equipment, piping or ductwork consisting of high strength galvanized steel aircraft cable. Cable must have Underwriters Laboratories listed certified break strength, and shall be color-coded for easy field verification. Secure cable to structure and to braced component through bracket or stake eye specifically designed to exceed cable restraint rated capacity. Cable must be manufactured to meet or exceed minimum materials and standard requirements per AISI Manual for structural applications of steel cables and ASTM A630. Break strengths must be per ASTM E-8 procedures. Safety factor of 1.5 may be used when prestretched cable is used with end connections designed to meet the cable break strength. Otherwise safety factor 3.76 must be used. Cables shall be sized for a force as listed in section 1.03. Cables shall be installed to prevent excessive seismic motion and so arranged that they do not engage during normal operation. Restraint shall be Amber/Booth Type LRC or approved equal.

2.4 ROOFTOP UNIT CURBS AND ISOLATION SYSTEMS

A. Specification X: Non isolated seismically rated rooftop curb system that is flashed into roofing membrane. Air and watertight curb shall have a neoprene sponge seal at the top and be rigid enough provide continuous perimeter support for rooftop unit. Curb must provide means to positively anchor to concrete deck, or bolt or weld directly to structural steel to withstand seismic loading. Curb shall provide a means by which contractor supplied insulation may be installed for thermal insulation and acoustic attenuation. Curbs shall accommodate roof pitch and contractor is to verify roof pitch before ordering. Curb shall use minimum 16 gage galvanized steel and shall be designed with cross bracing required to withstand the greater of seismic forces (para 1.03.) or wind loading per local building code. Design must be certified by registered professional engineer in the employ of the manufacturer. Seismic curbs shall be Amber/Booth Type RTC or approved equal.

B. Specification Y: An extruded aluminum rail base for roof top air conditioning units consisting of top and bottom weatherproofed aluminum rails for mounting between equipment and roof curb, incorporating wind/seismic restraints and a continuous air and water seal which is protected from accidental puncture and direct sunlight by an aluminum weather shield. Rails shall incorporate free standing, open spring isolators (minimum kx/ky of 1.0) properly spaced and sized around perimeter for the deflection listed in the isolation schedule. To prevent leaks, rails shall be factory assembled (to the limits of freight carriers) and shipped as a one-piece unit. Where spliced, corners to be factory assembled. Specification X rails may only be used where wind/seismic restraint are capable of withstanding seismic forces per paragraph 1.03. Seismic design of the curb supporting the isolation rail shall be provided by the roof curb manufacturer. Rails shall be Amber/Booth Type RTIR or approved equal.
C. Specification Z: Seismically rated rooftop isolation curb system that is flashed into roofing membrane. Standard unit curb will not be used. Air and watertight upper curb shall have a neoprene sponge seal at the top and be rigid enough provide continuous perimeter support for rooftop unit. The upper curb shall be supported by type C isolators welded or bolted to continuous structural support which is positively anchored to concrete deck or bolted or welded to the structure to withstand seismic loading. An EPDM nylon reinforced air-tight weatherproof seal shall consolidate the upper and lower curbs. Weatherproof access panel shall be provided at each isolator to allow isolator adjustment. Isolation curb shall provide a means by which contractor-supplied insulation may be installed for thermal insulation and acoustic attenuation. Curbs shall accommodate roof pitch and contractor is to verify roof pitch before ordering. Isolation curb shall use minimum 16 gage galvanized steel and shall be designed with crossbracing required to withstand the greater of seismic forces (para 1.3.) or wind loading per local building code. Design must be certified by registered professional engineer in the employ of the manufacturer. Isolation curbs shall be Amber/Booth Type RTIC or approved equal.

2.5 FLEXIBLE PIPE CONNECTIONS

A. Specification K: Water Service: For flanged connection – a double sphere arch rubber expansion joint constructed of molded reinforced neoprene with integral steel floating flanges, and designed to be suitable for pressures up to 225 PSI (4 to 1 safety factor) and temperatures up to 225 degrees F. Connectors shall have minimum movement capabilities of 1.77” compression, 1.18” lateral and 1.18” extension. Connectors shall provide a minimum 35 degree angular movement up to 6”, minimum 30 degree up to 12” and minimum 20 degree up to 24”. Spring loaded control units shall be furnished to limit movement to within allowables. Flex connector shall be Amber/Booth Type 2600 or approved equal.

1. Water Service: For threaded type – A double spherical rubber hose connector, minimum 8” long, constructed of molded neoprene, nylon cord reinforced, with female pipe unions each end. Connectors shall have a minimum movement capability of 7/8” compression, 7/8” lateral, ¼” extension and 20 degree angular through 1-1/4”, 13 degree through 2”, and 9 degree through 3”. Connectors shall be suitable for a maximum working pressure (4 to 1 safety factor) of 150 psi and 225 degree F. Connectors shall have cable control units to limit extension to ¼”. Flex connector shall be Amber/Booth Type 2655 or approved equal.

B. Specification L: Steam and Condensate Service:

1. For flanged connection – a metal hose connector constructed of stainless steel hose and braid with carbon steel plate flanges. Live lengths shall conform to hose minimum length to absorb thermal and dynamic movement. Hose axis must be perpendicular to pipe movement. Flex connector shall be Amber/Booth Type SS-FP or SS-FW or approved equal.

2. For threaded connections - a metal hose connector constructed of stainless steel hose and braid with carbon steel NPT threaded end fittings. Flex connector shall be Amber/Booth Type SS-PM or approved equal.
C. Air Compressor Service:

1. For flanged connection – a flanged metal hose connector constructed of stainless steel hose and braid with carbon steel plate flanges. Connector shall be double braided with a minimum live length equal to four times the diameter. Connector shall be installed with the long axis perpendicular to the motion to be absorbed. Amber/Booth Type SS-FP (Special).

2. For threaded connection – a metal hose connector constructed of stainless steel hose and braid with carbon steel NPT threaded end fittings. Connector shall be double braided and have a minimum live length equal to four times the diameter. Connector shall be installed with the long axis perpendicular to the motion to be absorbed. Amber/Booth Type SS-PM (special) or approved equal.

PART 3 EXECUTION

3.1 Isolator and seismic restraints shall be installed as recommended by the manufacturer. Isolate all mechanical equipment 3/4 hp and over per the isolation schedule and these specifications.

3.2 PIPING ISOLATION

A. Horizontal Pipe Isolation: all HVAC pumped water, steam, pumped condensate, glycol, and refrigerant piping size 1 1/4” and larger connected to isolated equipment shall be isolated for the first 3 support locations from externally isolated equipment with specification E hangers or specification SB or SX floor mounts with the same deflection as equipment isolators (max 2”).

B. Pipe Riser Isolation: All variable temperature vertical pipe risers 1-1/4” and larger, riser piping requiring isolation per para. 3.02A or where specifically shown and detailed on riser drawings shall be fully supported by specification B mounts with precompression plates. Steel spring deflection shall be .75 inch minimum except in those locations where added deflection is required due to pipe expansion and contraction. Spring deflection shall be a minimum of 4 times the anticipated deflection change. Springs shall be selected to keep the riser in tension. Pipe risers up through 16” shall be supported at intervals of every third floor of the building. Pipe risers 18” and over, every second floor. Wall sleeves for take-offs from riser shall be sized for insulation O.D. plus two times the anticipated movement to prevent binding. Horizontal take-offs and at upper and lower elbows shall be supported with spring isolators as required to accommodate anticipated movement. In addition to submittal data requirements previously outlined, riser diagrams and calculations shall be submitted for approval. Calculations must show anticipated expansion and contraction at each support point, initial and final loads on the building structure, and spring deflection changes. Submittal data shall include certification that the riser system has been examined for excessive stresses and that none will exist if installed per design proposed. Riser supports shall be Amber/Booth Type SWP or approved equal.
3.3 DUCT ISOLATION

A. Isolate all duct work with a static pressure 2” W.C. and over in equipment rooms and to minimum of 50 feet from the fan or air handler. Use specification type E hangers or type SB (SX) floor mounts or approved equal.

3.4 INSTALLATION

A. Comply with manufacturer’s instructions for the installation and load application of vibration isolation materials and products. Adjust to ensure that units do not exceed rated operating deflections or bottom out under loading, and are not short-circuited by other contacts or bearing points. Remove space blocks and similar devices (if any) intended for temporary support during installation or shipping.

B. Locate isolation hangers as near the overhead support structure as possible.

C. Adjust leveling devices as required to distribute loading uniformly on isolators. Shim units as required where leveling devices cannot be used to distribute loading properly.

D. Install isolated inertia base frames and steel bases on isolator units as indicated so that a minimum of 1 inch clearance below base will result when supported equipment has been installed and loaded for operation.

E. Seismic Rated roof curbs shall be installed directly to building structural steel or concrete roof deck. Installation on top of steel deck or roofing material is not acceptable. Shimming of seismic rated curbs is not allowed.

F. Housekeeping Pads shall be constructed and installed per ASHRAE’s “A Practical Guide to Seismic Restraint”. They shall be a minimum of .5” thicker than the maximum embedment required of any anchor but not less than 6”. They shall be sized to provide minimum edge distances for all installed anchors. They must be anchored to the floor structure in an approved manner.

3.5 APPLICATION OF SEISMIC RESTRAINTS

A. ISOLATED EQUIPMENT

1. All floor mounted isolated equipment shall be protected with type SB or type C unitized isolator and restraint or with separate type SL restraints (minimum of 4) in conjunction with type B isolators. For equipment with high center of gravity additional cable restraints shall be furnished, as required by isolation manufacturer, to limit forces and motion caused by rocking.

2. All suspended isolated equipment and vessels shall be protected with specification SC restraints. Cables shall be installed to prevent excessive seismic motion and so arranged that they do not engage during normal operation.
3.6 PIPING

A. All piping shall be protected in all planes by type SC restraints, designed to accommodate thermal movement as well as restrain seismic motion. (Spring-loaded control rods should be used on flexible connectors in system). Tanks and vessels connected inline to piping shall be restrained independently. Locations shall be as determined by the isolator/seismic restraint supplier and shall include, but not be limited to: (1) At a proximity to protect all drops to equipment connections. (2) At changes in direction of pipe as required to limit over stressing of pipe or movement that contacts other building material. (3) At horizontal runs of pipe, not to exceed the spacing as presented in Amber/Booth design criteria. (4) SMACNA design criteria. Seismic restraints shall not be required for piping exempted by paragraph 1.02.

B. Where riser pipes pass through cored holes, core diameters to be a maximum of 2” larger than pipe O.D. including insulation. Cored holes must be packed with resilient material or firestop as provided by other sections of this specification or local codes. No additional horizontal seismic bracing is required. Restrained isolators type C or SB shall support risers and provide longitudinal restraint at floors where thermal expansion is minimal and will not bind isolator restraints. For risers in pipe shafts, specification type SC cable restraints shall be installed at each level in a manner that does not interfere with thermal movement.

3.7 DUCTWORK

A. Duct work 6 square feet and larger in cross sectional area shall be protected in all planes by type SC restraints. Locations shall be determined by the isolator supplier and shall include, but not be limited to: (1) at equipment connections as required to protect the connections and (2) at all duct runs and duct run ends (transverse bracing and longitudinal bracing not to exceed spacing specified in Amber/Booth design criteria, or SMACNA guidelines).

END OF SECTION 23 05 48
PART 1 GENERAL

1.1 SCOPE

A. Work in this section includes the adjusting and balancing of all hydronic systems. The results of all tests, adjustments, and balancing shall be submitted to the Architect for approval.

B. Provide all labor, supervision, tools, equipment, instruments, additional materials, report forms, etc. as required to complete an accurate balance of the system.

C. Belts, drives, impellers, and motors shall be adjusted and/or changed as required to obtain the required air and water quantities against the developed system pressure.

D. The building water distribution system is to be balanced to provide the flow rates shown on drawings. System water balance is to be accompanied with certified test forms as to obtained air quantities. Water temperature readings across equipment shall be provided where appropriate.

F. Mechanical Contractor shall furnish competent personnel and necessary testing instruments and equipment to check, test, operate, and adjust all mechanical equipment and systems as installed. Tests shall be as required to ensure that all equipment is operating in accordance with manufacturer's recommendations, and requirements of this specification. Tests shall be of sufficient duration to prove adequacy and satisfactory performances of all items of equipment.

G. Mechanical contractor shall supply upon request without additional charge, instrumentation and personnel to spot check system balance in presence of Engineers and Owner.

H. All tests, balancing, and adjusting shall be performed as many times as required to prove project requirements have been met.

I. Control Contractor shall adjust and set all thermostats, program clock, and other control items of equipment as required. Contractor shall submit to the Architect and Engineers record copies of Control Contractor's certification that all specified control items of equipment have been installed, calibrated, and are operating properly.

1.2 QUALITY CONTROL

A. All final testing and balancing work shall be performed in complete accordance with AABC Standards for Field Measurements and Instrumentation. The Balancing work shall be performed by an Owner / Engineer-approved independent balance and test firm.

B. All work shall be under the direct supervision of a professional who is qualified for testing and balancing the hydronic and air performance of heating, air conditioning, and ventilation systems and has a minimum five years experience in the field.
C. Testing and balancing instruments shall have been calibrated within a period of six months prior to use in this work. Instruments used shall be of high quality and as recommended by AABC for the particular application.

D. Balance and Test Contractor is to submit a proposal at the start of the project of when items that require balancing should be balanced.

1.3 SUBMITTALS

A. Before starting field work submit for approval forms, data sheets, a list of instruments and procedures.

B. Prior to acceptance of the system by the Owner, submit for approval a written report in triplicate. The reports shall be complete showing all quantities, velocities, pressure drops, and sizes.

PART 2 PRODUCTS

2.1 PROVIDE ALL MATERIALS, test equipment and instruments required for the tests.

2.2 BELTS, DRIVES, IMPELLERS AND MOTORS shall be as specified in other sections of this specification for the equipment being adjusted.

PART 3 EXECUTION

3.1 ADJUSTMENTS

A. Thoroughly clean, flush, fill and test all systems as specifically recommended by the various equipment manufacturers and as required. Check all safety relief valves, high limit controls, freeze protection controls, and all other safety devices to determine if they are functioning properly.

B. Mechanical systems are intended to operate without objectionable noise and vibration. Make all reasonable adjustments to the installed materials and equipment to remove abnormal noise and vibration. Report, in writing, any condition that such adjustments do not correct.

3.2 TESTING AND BALANCING

A. Balance and test Contractor shall provide personnel and instrumentation to adjust, balance, record, and submit not less than two test results (including final test) for each of the following:

1. Circulating Water Pumps
   a. No Flow Differential
b. Wide Open Differential

c. Final Suction and Discharge

d. Final GPM

e. Pump Off Pressure

f. Motor Amperage and Voltage

2. Adjust and record air quantities for all air distribution equipment in accordance with CFM's specified on drawings.

3. Check and record return and discharge air temperature from all refrigeration equipment.

B. Submit record copies of all testing and balancing reports to the Architect and Engineers.

C. Test results shall be presented on approved forms similar to those presented in the Forms Section of these specifications. Submit three (3) copies of these reports to the Owner for approval prior to final building acceptance.

END OF SECTION 23 05 93
SECTION 23 07 00 - INSULATION OF MECHANICAL SYSTEMS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Trained personnel regularly engaged in the installation of insulation and approved by the insulation manufacturer shall install the insulation in a neat and professional manner.

B. Except where specifically specified otherwise, all insulation, adhesives, coverings and coatings shall be applied in strict accordance with its respective manufacturer's recommendations.

C. No wheat paste or organic materials that breed or sustain mold shall be used in conjunction with the insulation work.

D. The Contractor shall verify that all tests and inspections of the work to be insulated have been completed and approved before the insulation is applied.

E. Adequate provisions shall be made to protect the premises, equipment, and the work of other trades against all droppings, adhesives and coatings used in the installation.

F. Pipe unions, strainers and flanges on hot lines shall not be insulated; starting and stopping points for the insulation on hot lines shall be 1 inch on either side and shall be neatly tapered and tightly sealed. Cold lines subject to sweating shall be insulated throughout, including unions, flanges and strainers.

G. Ample provisions shall be made at hanger and support points to prevent the compression of insulation beyond that recommended by the insulation manufacturer for the application.

H. All insulation shall have a composite insulation, jacket, binders, and adhesives fire and smoke hazard rating as tested by procedure ASTM E84, NFPA 255, and UL 723, not exceeding the following values and shall be so listed by UL:

   Flame Spread 25
   Smoke Developed 50

I. All accessories, including but not limited to, adhesives, mastics, tapes, shall have the same component ratings. All materials shall be labeled indicating compliance with the above requirements. All treatments used to obtain the required ratings shall be permanent; water-soluble treatments will not be acceptable. Flexible elastomeric insulation with smoke developed exceeding 50 is prohibited in ceiling plenums, return air plenums, or ductwork.

1.2 SUBMITTALS

A. Submit shop drawings and data to prove complete compliance with these specifications on all products and methods of installation.
1.3 SCOPE

A. Includes but not limited to insulation of the following items:

1. All interior hot water piping. (fiberglass)
2. Domestic Water Piping (fiberglass)
3. Cold Equipment. (Foamglas and Armaflex)
4. Hot Equipment (Armaflex)

1.4 QUALIFICATIONS

A. All insulation shall be installed in a workmanlike manner by qualified insulation mechanics. Install all insulation in strict accordance with the manufacturer's recommendations, using approved type laggings, adhesives, mastics, and other materials as applicable.

PART 2 PRODUCTS

2.1 STEAM AND STEAM CONDENSATE PIPING (Above Floor)

A. Piping shall be insulated with preformed sectional glass fiber pipe covering with factory applied jacket with self-sealing lap. The jacket for piping exposed to view shall be factory applied "All Service Jacket" or shall be pre-sized glass cloth. The insulation shall have a minimum density of 4 lb/ft³ and a maximum K value of .27 (BTU-in.)/(h-ft³-°F) at 75°F mean temperature.

B. Insulation R values shall in all cases meet or exceed the requirements of ASHRAE 90.1. The thickness of insulation shall be not less than the following:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Design Steam Temperature Up to 250°F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum K value (BTU-in.)/(h-ft³-°F)</td>
</tr>
<tr>
<td>Up to 1-1/2”</td>
<td>0.27</td>
</tr>
<tr>
<td>Over 1-1/2”</td>
<td>0.27</td>
</tr>
<tr>
<td>Over 6”</td>
<td>0.27</td>
</tr>
</tbody>
</table>

C. Insulation shall be Owens-Corning ASJ/SSL-II or approved equal.

2.2 HOT WATER PIPING

A. Piping shall be insulated with preformed sectional glass fiber pipe covering with factory applied jacket with self-sealing lap. The jacket for piping exposed to view shall be factory applied "All Service Jacket" or shall be pre-sized glass cloth. The insulation shall have a minimum density of 4 lb/ft³ and a maximum K value of .28 (BTU-in.)/(h-ft³-°F) at 75°F mean temperature.

B. Insulation R values shall in all cases meet or exceed the requirements of ASHRAE 90.1. The thickness of insulation shall be not less than the following:
### 2.3 COLD PIPING: (Water inside of building envelope above floor)

**A.** This specification applies to all cold piping including, but not limited to the following:

1. Chilled Water Piping, above grade inside of building
2. Drain Piping subject to receiving cold drainage water, including drain body to a point where other drains tie in.

**B.** Insulation R values shall in all cases meet or exceed the requirements of ASHRAE 90.1. The thickness of insulation shall be not less than the following:

<table>
<thead>
<tr>
<th>Design Chill Water Temperature Between 40 and 55°F</th>
<th>Pipe Size</th>
<th>Maximum K value (BTU-in.)/(h-ft³-°F)</th>
<th>Insulation Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1-1/2”</td>
<td>0.24</td>
<td>1”</td>
<td></td>
</tr>
<tr>
<td>Over 1-1/2”</td>
<td>0.24</td>
<td>1-1/2”</td>
<td></td>
</tr>
</tbody>
</table>

**C.** The piping shall be insulated with preformed, sectional glass fiber pipe covering with factory applied vapor barrier jacket with self-sealing lap except at hanger points. The insulation shall have a maximum k value of .24 (BTU-in.)/(h-ft³-°F) at 75°F mean temperature. The jacket shall have a water vapor permeance of .02 perms (ASTM E96) and shall have resistance to puncture of not less than 50 units per ASTM D781.

**D.** Chilled water exposed above grade shall be insulated with fiberglass sectional pipe covering, covered with two layers of pre-sized glass cloth and waterproof mastic. All piping within 5'-0” of finished floor shall be finished with a 0.016” thick aluminum jacket and sealed to prevent entry of water into the insulation. Insulation shall be applied over the electric heating tape. Mastics and all other products associated with the insulation shall be compatible with the electric heating cable.

**E.** Insulation shall be equal to Owens-Corning ASJ/SSL-II.

### 2.4 DOMESTIC WATER PIPING

**A.** Where piping is exposed to freezing conditions inside and outside the building, provide electric heating cable prior to installing insulation.

**B.** All domestic water piping shall be insulated with flexible foamed pipe insulation. Foam rubber insulation shall have a maximum k factor of .28 (BTU-in.)/(h-ft³-°F) at 75°F mean temperature and shall have an operating temperature range of -40 °F to 220 °F. Insulation shall comply with ASTM C-534 and UL 94-5v. Insulation shall be rated for use in return air plenum and shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less.
C. Insulation R values shall in all cases meet or exceed the requirements of ASHRAE 90.1. The thickness of insulation shall be not less than the following:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Maximum K value (BTU-in.)/(h-ft³-°F)</th>
<th>Insulation Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 1”</td>
<td>0.28</td>
<td>½”</td>
</tr>
<tr>
<td>1” to 2”</td>
<td>0.28</td>
<td>¾”</td>
</tr>
<tr>
<td>2” and over</td>
<td>0.28</td>
<td>1”</td>
</tr>
<tr>
<td>Fittings</td>
<td>0.28</td>
<td>1”</td>
</tr>
</tbody>
</table>

PART 3 EXECUTION

3.1 GENERAL
A. Install all insulation in strict accordance with the manufacturer's recommendations, using approved type laggings, adhesives, mastics, and other materials as applicable

3.2 ALL COLD AND HOT WATER PIPING (Inside building envelope)
A. At each hanger point on cold lines or combination cold and hot lines, a full length section of cellular glass insulation with factory applied fire retardant vapor-proof jacket shall be provided to completely encompass the pipe and form a traverse vapor seal and to provide a firm point for the hanger. All surfaces of the piping and inside surfaces of the insulation and all joints in the insulation shall be coated thoroughly with I-C 405 mastic in a jacket shall be sealed with I-C 215 lap cement. End joints shall be sealed to the fiberglass insulation with factory furnished 3" wide vapor barrier self-sealing lap tape. Aluminum bands shall be provided over the edges of the joint sealer strips on not greater than 12" on center.

B. Hangers for hot water lines shall be installed around the pipe and the insulation installed around the hanger. The insulation shall be applied to the pipe with all sides and end joints firmly butted. The longitudinal joints shall be sealed with the self-sealing lap and traverse joints shall be taped with 3 inch wide pressure sensitive pre-sized glass tape.

C. Insulation shall be applied to the pipe with all sides and end joints butted firmly. Seal off ends of insulation with white vapor barrier mastic at each fitting and at 21' intervals on continuous runs. The longitudinal joints shall be sealed with the self-sealing lap strip. The traverse joints shall be sealed with factory furnished 3" wide vapor barrier type pre-size glass cloth tape, pressure sensitive.

D. Insulated pipe risers inside the building that are exposed shall be protected from the floor to 8'-0' above the floor with a .016 inch thick aluminum jacket secured with stainless steel bands. Risers in shafts and chases do not require protection.

E. Contractor may, at his opinion, use 3" wide pressure sensitive vapor barrier pre-sized glass cloth to close the longitudinal joints in lieu of the self-sealing lap.
F. Insulation shall be applied to the pipe with all sides and end joints firmly butted. The longitudinal joints shall be sealed with the self-sealing lap and the traverse joints shall be taped with factory furnished 3" wide pressure sensitive pre-sized glass cloth tape.

G. Place sections of insulation around the pipe and joints tightly butted into place. The jacket laps shall be drawn tight and smooth. Secure jacket with fire resistant adhesive or factory applied self sealing lap.

H. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1 1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps.

I. Use a vapor-barrier coating or manufacturer's weatherproof coating for outside service on the ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints. Apply this vapor barrier coating at all longitudinal and circumferential laps.

J. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing and coating as specified for butt strips. Extend the patch not less than 1-1/2 inches past the break in both directions.

K. At penetrations by pressure gauges and thermometers, fill the voids with the vapor barrier coating for outside service. Seal with a brush coat of the same coating.

L. Do not use staples to secure jacket laps on pipes carrying fluid medium at temperatures below 35 °F.

M. Where penetrating roofs, insulate piping to a point flush with the top of the flashing and seal with the vapor barrier coating. Butt tightly the exterior insulation to the top of the flashing and interior insulation. Extend the exterior metal jacket 2 inches down beyond the end of the insulation. Seal the flashing and counter flashing underneath with the vapor barrier coating.

N. Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields or MSS SP-58, Type 39 protection saddles conforming to MSS SP-69. Where shields are used on pipes 2 inches and larger, provide insulation inserts at points of hangers and supports.

1. Insulation inserts shall be of calcium silicate, cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation.
2. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation.
3. Insulation inserts shall cover the bottom half of the pipe circumference 180 degrees and be not less in length than the protection shield. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation.
4. Seal inserts into the insulation with vapor barrier coating for exterior work or manufacturers recommended weatherproof coating, as applicable.
5. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.
6. Where anchors are secured to chilled piping that is to be insulated, insulate the anchors the same as the piping for a distance not less than four times the insulation thickness to prevent condensation. Vapor seal insulation around anchors.

O. For Flanges, Unions, Valves, Anchors, Fittings for Cold Piping, Factory-fabricated removable and reusable insulation covers may be used.

P. For piping insulation inside the building, coat pipe insulation ends with vapor barrier coating not more than six inches from each flange, union, valve, anchor or fitting.

1. Place insulation of the same thickness and conductivity as the adjoining pipe insulation (either pre-molded or segmented) around the item, butting the adjoining pipe insulation.
2. If nesting size insulation is used, overlap the insulation 2 inches or one pipe diameter.
3. Use loose fill mineral wool or insulating cement to fill the voids.
4. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish coating is applied.
5. Apply two coats vapor barrier coating with glass tape embedded between coats. Overlap tape seams one inch. Extend the coating out onto the adjoining pipe insulation 2 inches.
6. Insulate anchors attached directly to the pipe for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.

Q. Insulate flexible connections at pumps and other equipment with unicellular plastic insulation, unless otherwise indicated.

R. At the option of the Contractor, premolded, one-piece polyvinyl chloride (PVC) fitting covers may be used in lieu of the embedded glass tape. Factory premolded insulation or field-fabricated insulation segments shall be used under the fitting covers. Blanket inserts may be used. Secure the covers with adhesive and vapor barrier tape with a vapor resistance of maximum 0.05 perm per ASTM E 96, or with tacks made for securing PVC covers. Then coat all tape seams and tacks with vapor barrier coating. Do not use premolded PVC fitting covers where exposed to weather.

3.3 DOMESTIC WATER PIPING

A. All piping outside the building or in rooms subject to freezing temperatures shall be traced with electrical heat tracing for freeze protection prior to insulation.

B. Water piping exposed above grade shall have insulation covered with two layers of pre-sized glass cloth and waterproof mastic and finished with a 0.016" thick corrugated aluminum jacket and sealed to prevent entry of water into the insulation.

C. Insulation shall be applied over the electric heating tape. Mastics, etc. shall be compatible with the electric heating cable. Pressure sensitive taped joints and seams will not be accepted.

END OF SECTION 23 07 00
SECTION 23 09 00 - CONTROLS

PART 1 GENERAL

1.1 SCOPE

A. Furnish and install a complete system of direct digital automatic temperature and energy management controls as specified below and as manufactured by Johnson Controls. All systems additions shall be compatible with and be capable of total integration with the existing Campus-wide Johnson Controls METASYS control system.

B. All control wiring shall conform to Electrical Section of these specifications, National Electrical Code, and unit manufacturer's recommendations.

C. New controls shall be compatible with existing Host Computer system and all points added as a part of this project shall be added to the Computer's data base along with new graphic displays for all new systems and equipment. All adjustable setpoints and monitored points shall also be available at the Host Computer. Provide all necessary hardware and software required.

1.2 GUARANTEE

A. After completion of the installation, the Contractor shall adjust all sensors, control valves, motors and other equipment provided under this contract with trained personnel in the direct employ of the manufacturer. He shall place them in complete operating condition subject to the approval of the Owner and instruct the operating personnel in the proper use of the equipment.

B. The control system as specified herein shall be guaranteed free from defects in workmanship and materials under normal use and service for a period of one year from date of acceptance by the Owner. Any equipment proven to be defective in workmanship or materials during the guarantee period shall be adjusted, repaired, or replaced by the Controls manufacturer at no charge to the Owner.

1.3 OPERATING AND MAINTENANCE INSTRUCTIONS.

A. 3 bound and indexed Operating and Maintenance Manuals with 3 indexed CD’s shall be prepared and submitted to MUSC operating personnel. A.pdf formatted copy of the O & M Manual shall be provided to the Engineers on a CD. The pdf document shall be indexed by section.

B. Each manual shall contain the following information, data and drawings:

1. List of contents. Insert under front cover.
2. Copy of approved submittals, shop drawings and control diagrams.
3. Installation, operating and maintenance instructions for each item of equipment.
4. Manufacturer's list of renewal parts for each item of equipment with recommended stock items and quantities indicated.
1.4 QUALITY ASSURANCE.

A. Materials and equipment shall be the cataloged products of Controls Manufacturer.

B. Install system using competent workmen who are fully trained in the installation of proper operation of the Facilities Management and Control System.

C. Single source responsibility of supplier shall be the complete installation and proper operation of the FMCS and shall include debugging and proper calibration of each component in the entire system.

D. Factory Quality Certification:

1. The manufacturer of the Facilities Management and Control System shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing). The intent of this specification requirement is to assure that the products from the Temperature Control System Manufacturer are delivered through a Quality System and Framework that will assure consistent quality in the products delivered for this project.

2. Product literature provided by the Facilities Management and Control System Manufacturer shall contain the ISO-9001 Certification Mark from the applicable registrar.

1.5 SUBMITTALS

A. Before installation of controls, submit twelve copies of complete submittal data, including equipment specifications, control diagrams, schematic diagrams, internal connections, and sequence of operation to the Architect for approval. Diagrams shall show all instruments, devices, tubing, etc. Set points and actions of instruments, operating ranges, and normal position of controlled devices shall be indicated. Operating sequence describing each system shall appear on the same drawing as the system's control diagram.

B. Wiring diagrams shall show conduit and wire sizes, transformers, fuses, and correct schematic diagrams for each motor starter and magnetic contactor. Diagram shall be coordinated with the equipment manufacturers involved and shall show the terminal designations for all connections to the equipment and the manufacturer's approval obtained.

C. Control submittal shall include a list of all graphic screens to be provided. Include in the submittal a flow chart of how the graphics will be interlinked. A schematic of each graphic shall be provided with all display data clearly identified.

D. Upon completion of the work, provide a complete set of drawings and application software on CD. Drawings shall be provided as AutoCAD compatible files.
PART 2 PRODUCTS

2.1 ELECTRICAL WIRING

A. All electrical wiring, both control and interlock, shall be provided under this section of the specifications unless specifically indicated otherwise hereinafter or under the Electrical Section of the specifications.

B. Under this section of the specifications, control and interlock circuits required to enter a motor control center shall be extended to a junction box in the immediate vicinity of the motor control center. Each circuit shall be provided with a minimum of 15 feet of properly tagged wire for extension to and termination in the Motor Control center under the Electrical Section of this specification. The control manufacturer shall coordinate the wiring with the electrical equipment furnished and shall be responsible for proper terminations.

C. Unless otherwise indicated, the control power for each system shall be taken from the 115 volt circuit at each panel, with a control voltage transformer, circuit breaker, and disconnect switch.

D. Refer to the Electrical Section of the specifications regarding motor starters. Only one source of power will be allowed in a starter enclosure, unless specifically noted otherwise, and relays will be used to control starter coils; however, interlock circuits may be run through auxiliary contacts of starters without additional relays unless same are required by the control functions.

E. All wiring shall be run in galvanized or sherardized rigid electrical conduit or E.M.T. where allowed under the electrical section of the specifications, and shall be concealed in finished areas and occupied spaces. All conduit shall be attached to ceiling or walls, attachment to or suspension from other equipment will not be permitted. If routing of conduit is questionable, verify routing with Engineers before proceeding with installation.

F. Unless specifically indicated elsewhere, all power wiring from the breaker panel to all control devices including but not limited to control panels, valves, thermostats, dampers, flow switches, control dampers, and other devices requiring power for a complete and operating system shall be provided under this Section of the work.

G. CONDUCTORS

1. 50 to 600 volts:
   a. Use solid copper, 75 °C type THW, THWN or XHHW for conductors No. 10 AWG and smaller unless otherwise indicated on the drawings, required by the National Electrical Code, or specified elsewhere. Where fixtures are used as raceway use 90 °C type THHN or XHHN conductors.
   b. Use No. 12 AWG stranded type THHN/THWN for control conductors on 120 volt control wiring systems unless indicated otherwise on the drawings.
   c. Splices and taps (No. 10 AWG and smaller) - Connectors for solid conductors shall be solderless, screw-on, spring pressure cabled type, 600 volt, 105 degrees C with integral insulation and UL approved for aluminum and copper conductors. Use crimp-on type connectors with integral insulating cover on stranded conductors.
d. Electrical insulating tape shall be 600 volt, flame retardant, cold and weather resistant, minimally .85 mil thick plastic vinyl material; Scotch No. 88, Tomic No. 85, Permacel No. 295.

2. Below 50 volts:
   a. Minimum size for individual conductors is AWG No. 18. Minimum conductor sizes for multiconductor cables is AWG No. 22. Low voltage conductors are allowed to be run in above ceiling space and in walls except where space if defined as a plenum such as above furred ceilings. In plenums, (including mechanical rooms) conductors shall be run in raceway per NEC Article 300-22 or shall be covered with Teflon FEP insulation approved for plenum applications. All other wiring (e.g., wiring run outside or exposed) shall be run in conduit.
   b. Taps and Joints: Mechanically and electrically sound.
   c. Color Code: All low voltage control conductors shall be color coded by factory.
   d. Conductor Insulation: "TFFN", unless noted otherwise.
   e. Manufacturers: Some approved manufacturers are Anaconda, Belden, Brand Rex, Continental, General Cable, Phelps Dodge, Simplex and Triangle.

H. CONTROL VOLTAGE

1. 120 volt or less control is required and may be accomplished either by individual control transformers or use of internal panel transformer where available. Where panel transformers are utilized, circuits shall be increased as necessary. In either, fuses and disconnects shall be provided in each ungrounded primary leg.

2.2 CONTROL DEVICES AND ACCESSORIES

A. Positive positioning devices shall be provided for all control motors and valve operators used for proportioning or sequencing control, to make available the full power of the motor in both directions.

B. Pressure switches shall be complete with mercury or otherwise totally enclosed switching action. The pressure switches shall be suitable for the service and application in which applied and shall be of the adjustable type with ranges as required.

2.3 CONTROL VALVES

A. Valves shall be of the modulating or two-position, three-way or two-way as required and/or indicated and shall be suitable for the pressures, temperatures, and operating conditions to be encountered. Valves 2 inches and smaller shall have bronze bodies with screwed ends, and valves 2-1/2 inches and larger shall have iron bodies with flanged ends. Modulating valves shall have renewable seats and V-port or equal percentage plug. Three-way modulation valves shall have linear inner valves. All two-way valves shall have single-seal and shall be for "dead-end" service with shut off pressure rating greater than the peak system pressure.

B. Three-way valves for modulating use on water service shall be semi-balanced, all metal, double-seated valves.
C. All control valves shall be provided with high torque electronic actuators with a maximum full stroke time of 30 seconds or less, actuators shall be provided with position feedback transducers.

2.4 MOTOR OPERATED DAMPERS

A. Motor operated dampers shall be as specified under the "Air Distribution" Section of the specifications.

B. All actuators for motor operated control dampers shall be provided under this Section unless specifically noted otherwise. Actuators shall be sized based on 150% or the damper manufacturer’s minimum torque specification and shall be provided with positive position feedback transducers.

2.5 THERMOSTATIC DEVICES

A. Firestats shall be electric, or the rigid element or remote bulb type as required, but shall be manually reset. Firestats shall have a fixed setpoint, and shall be set at 125°F, unless otherwise noted. All firestats shall have 2 circuit contact blocks for 4 wires.

B. Freezestats shall be as described heretofore for remote bulb thermostats, except shall be equipped with a capillary sensing element with an active length of not less than 20 feet, 1 foot of which, at any point along the element, shall be capable of activating the control instrument. All freezestats shall have 2 circuit contact blocks for 4 wires. One contact to be used for monitoring.

C. Electronic temperature sensors shall consist of nickel wire windings which varies its resistance with temperature changes. The elements shall be precision wound to a resistance tolerance of .10% at 70°F. Insertion elements other than for air shall be wound on a rigid tube and used with immersion wells. Duct insertion elements shall be averaging element protected type. Elements used outdoors shall be encased in a waterproof conduit fitting. Elements used for room sensing shall be encased in thermostat covers matching other room thermostats.

2.6 FIELD SENSORS AND DEVICES

A. ANALOG INPUT DEVICES

1. Resistor Temperature Detector (RTD): RTD's shall have a range of minus 50 to plus 250 °F, with a resistance tolerance of 0.10% at 70°F. The RTD shall be encapsulated in epoxy, series 300 stainless steel, or a copper sheath. The RTD's shall be provided in either probe mounting, averaging element, or for mounting in a separable well for liquid sensing applications.

2. Humidity Sensors: Humidity sensors shall be solid state with a range of 10 to 90 % RH with an accuracy of plus or minus 2% at 70°F. The sensing element shall be of the non-saturating type. Provide either duct or wall mounted versions based on the application required.
3. Pressure to Electric Transducers: For sensing applications where a pneumatic control signal exists, provide a pressure to electric transducer that develops a 1 to 5 VDC signal in response to a 3 to 15 psi input. The transducer shall be designed for operation at 24 VDC with a maximum current draw of 4 mA maximum. The transducer shall be rated for 150 percent of the normal input pressure.

4. Differential Pressure Transmitters: Provide electronic static pressure transmitters for the appropriate ranges as indicated on the plans or in the specifications. The device shall provide for ranges of from 0 to 0.1 inches of water column up to 0 to 10 inches of water column. Accuracy at any range shall be plus or minus one percent full scale. Units shall be rated for ten times normal input pressure. Unit shall operate from the panel 24 Volt DC supply.

B. BINARY INPUT DEVICES

1. Differential Pressure Switches: Provide a differential pressure switch with single pole double throw contacts. Switch operation shall be adjustable over the operating range. The switch shall have a snap-acting Form C contact rated for the application. The switch contacts shall be rated for 5 amps at 120 volts as a minimum.

2. Pressure Switches: Pressure switches shall have a repetitive accuracy of plus or minus one percent of their operating range and shall withstand up to 150 percent of rated pressure. Sensors shall be diaphragm or bourdon tube. Switch operation shall have a snap-acting Form C contact rated for the application. Switch contacts shall be self-wiping contacts of platinum alloy, silver alloy, or gold plated, and shall have an adjustable differential setting.

C. OUTPUT DEVICES

1. Control Relays: Control relay contacts shall be rated for the application, with a minimum of two sets of Form C contacts, enclosed in a dustproof enclosure. Relays shall have silver alloy contact material. Relay operation shall be in 20 milliseconds or less, with release time of 10 milliseconds or less. Relays shall be equipped with coil transient suppression (limiting transients to non-damaging levels). All control relays shall be of the plug-in style with a separate base. All wiring shall be terminated to the base and not the relay itself.

D. DAMPER OR VALVE OPERATORS

1. Damper or valve operators shall be provided for each automatic damper of valve and shall be of sufficient capacity to operate the damper of valve under all conditions, and to guarantee tight close-off of valves, as specified, against system temperatures and pressure encountered. Each operator shall be full-proportioning or two-position type as required, indicated or specified, and shall be provided with spring return for normally closed or normally open position for fire, freeze, or moisture protection on power interruption as required.

2. Provide operators with proper linkages and brackets for mounting and attaching to devices.

3. Electronic Actuators: Actuators shall be sized and adjusted to provide tight close-off as required by the sequence of operation. Actuators found not to have enough torque for positive close-off shall be replaced with actuators and accessories required to make controlled device meet its intended purpose.

4. All actuators shall be provided with positive feedback position indicators and end switches.
E. LOCAL CONTROL PANELS

1. Local control panels shall be constructed of steel or extruded aluminum with hinged door and keyed lock, with baked enamel finish of manufacturer's standard color. All controlling instruments, temperature indicators, relays, switches and gauges shall be factory installed and permanently labeled and located inside or face of the panel. Unless otherwise indicated, mount control and adjusting switches, temperature indicators, and other indicating or manually operated devices on the front face of the panel with suitable engraved nameplates.

2. Approved AS-BUILT control diagrams shall be mounted inside of each panel.

2.7 ENERGY MANAGEMENT SYSTEM

A. The existing energy management system shall be upgraded for the new equipment. New equipment shall have the ability to maintain operation even if communication is lost from the central control facility.

B. Energy Management Functions:

1. Each controller shall be capable of performing the following energy management routines as a minimum.
   a. Time of day scheduling (365 day Clock)
   b. Timed overrides of daily programs
   c. Start/stop time optimization
   d. Peak demand limiting
   e. Duty cycling (temperature compensated)
   f. Economizer control
   g. Enthalpy changeover
   h. Supply air reset
   i. Chilled water reset
   j. Outdoor air reset
   k. Event initiated programs
   l. Occupied/unoccupied modes

C. Control Functions:

1. Each controller within the Building Control System shall perform both temperature control functions and energy management routines as defined by the operator.

2. All temperature control functions shall be executed within the DDC unit. Loop control shall be executed via direct digital control algorithms. The user shall be able to customize control strategies and appropriate control loop algorithms and choose the optimum loop parameters for loop control. Control loops shall support any of the control modes:
   a. Two-position (on-off, slow-fast, etc.)
   b. Proportional (P)
   c. Proportional plus integral (PI)
   d. Proportional, integral, plus derivative (PID)

3. It shall be possible to fully create, modify or remove control algorithms within a specific DDC unit while it is operating and performing other control functions. Each control loop shall be fully user definable in terms of:
a. Control mode
b. Gain
c. Control action
d. Sampling time

4. In order to minimize wiring and sensor costs, provide DDC units that are able to share point information such that control sequences or control loops executed at one control unit may receive input signals from sensors connected to other DDC units.

5. The system shall permit the generation of job-specific control strategies that can be activated in any of the following ways:
   a. Continuously
   b. At a particular time-of-day
   c. On a pre-defined date
   d. When a specific measured or controlled variable reads a selected value or state.
   e. When a piece of equipment has run for a certain period of time

D. Battery Backup:

1. Upon a loss of commercial power to any DDC unit, other units shall not be affected, and the loss of operation of that unit shall be reported at the designated operator's terminal. All control strategies and energy management routines defined for the DDC unit shall be retained during a power failure via the battery with the unit for a minimum of seven (7) days. Upon resumption of commercial power, the control unit shall resume full operation without operator intervention. The unit shall also automatically reset its clock such that proper operation of timed sequences is possible without the need for manual reset of the clock. Controller provided with non-volatile EEPROM memory for all control parameters shall be except from battery back up system.

E. User Specified Programs:

1. The library of routines available in firmware must be capable of generating programs specified by the user. These shall include but are not limited to
   a. Intermediate season control (dead Zone)
   b. Trending of variable
   c. Historical data storage
   d. Totalizing
   e. Holiday programming

F. Operator Interface:

1. The operator interface shall be capable of providing digital displays of all points addressed within the particular level two and level three controllers.
2. Each addressable hardware and software point shall be capable of being manually displayed and overridden through the operator interface.
3. In addition to local display on controller, one laptop computer for connection to system LAN and second and third level controller shall be provided as a part of this contract.
G. Field Programmable:

1. The controller shall contain all necessary mathematic, logic, utility functions and all standard energy calculations and control functions in ROM to be available in any combination for field programming the unit. These routines shall include but not be limited to:
   - Math Routines:
     a. Basic Arithmetic
     b. Binary Logic
     c. Relational Logic
     d. Fixed Formulas for Psychometric Calculations
   - Utility Routines For:
     a. Process Entry and Exit
     b. Keyboard Functions
     c. Variable Adjustments and Output
     d. Alarm Indication
     e. Restart
   - Control Routines For:
     a. Signal Compensation
     b. Loop Control
     c. Energy conservation
     d. Timed Programming

2. Final field programs shall be stored in battery backed-up RAM or non-volatile EEPROM.

H. Expandability:

1. The unit shall be expandable by adding additional field interface units that operate through the processor of the controller. The processor in the DDC shall be able to manage remote field interface units thereby expanding its control loop and energy management point capacity.

I. Calibration Compensation:

1. To maintain long term analog accuracy in the controller sensing circuits, the unit shall sense the voltage being supplied to the resistance sensing element and through firmware, and compensate for power supply changes due to long term drift or drift due to ambient temperature changes at the power supply.

J. Diagnostics:

1. Each unit shall contain self diagnostics that continuously monitors the proper operation of the unit. A malfunction of the unit will be reported, and will inform the operator of the nature of the malfunction, and the control unit affected. It shall be possible to annunciate malfunctions as well as other control unit alarms at a selected central operator's terminal.
2. The system shall allow on-line diagnosis IP/MSTP connection from a remote location.
K. Default Operating Procedure Alarms:

1. All variables shall be identified as being reliable or unreliable. When a calculation is required to use a value (sensed or calculated), which is identified as being unreliable, the unreliable data value will flash. The calculation will use a default value programmed into the unit. All alarms shall be displayed at the controller. A scan can then identify all alarm conditions and their identifier.

L. Adaptive Control:

1. The system shall be provided with an adaptive control setup to monitor indoor/outdoor temperatures and respond automatically to changing conditions to provide:
   a. Optimize morning start-up time to provide minimum warm-up or cool-down.
   b. Temporarily increase on-time of duty-cycled loads to correct indoor temperature variances during occupied hours.
   c. Provide night setback by automatically starting "normally off" equipment at night to keep building temperature above field adjustable low limit.
   d. Provide minimum on-time of HVAC equipment through multiple-zone control.
   e. All set points and programs shall be easily adjusted to suit individual building characteristics.

M. Demand limiting:

1. The ability to set demand control record KW setpoint level and automatically shed building loads to maintain demand setpoints shall be provided.

N. Remote Access:

1. System access to all levels of controller shall be capable via standard WEB BROWSER communication via Owners Campus Wide WAN system. Remote access shall required no additional software and shall include the ability to allow all data and programming information to be either uploaded or downloaded from a remote location.

O. Cabinet:

1. The controller shall be enclosed in a metal cabinet. The cabinet shall be constructed such that it can be mounted and electrical terminations made during the construction phase of the project.
2. The unit cabinet shall be outfit with an owner provided key lock. All cabinets on each installation shall utilize one master key.
PART 3 EXECUTION

3.1 INSTALLATION OF INSTRUMENTS

A. Install all room thermostats and fan switches 4' AFF unless otherwise specified on plans. All room thermostats shall be furnished by unit manufacturer and wired in accordance with equipment manufacturer's recommendations for proper unit control. All control wiring shall conform to Electrical Section of these specifications, National Electrical Code, and unit manufacturer's recommendations.

B. Space instruments shall have programmable adjustments.

C. All controls mounted outside building shall have weatherproof enclosures.

D. Control Panels shall be located in mechanical rooms and shall be installed 5' AFF and shall be anodized aluminum or steel with baked enamel finish and designed for wall mounting. All devices on panel cover and inside panel shall be identified by plastic nameplates. Provide hinged locking door for access to devices inside panel. All enclosures and cabinets housing electrical apparatus and the secondary side of all transformers shall be grounded.

3.2 WIRING

A. All conduit shall be attached to ceiling or walls, attachment to or suspension from other equipment will not be permitted. If routing of conduit is questionable, verify routing with Engineers before proceeding with installation. All wiring shall be numbered with labels identical to the wiring numbers on the control drawings.

3.3 RECORD DRAWING

A. A copy of the complete reviewed control diagram shall be permanently mounted in each control panel identifying all wiring, control devices, and terminal labels.

3.4 IDENTIFICATION

A. Engraved plastic nameplates shall be provided for all control equipment. Lettering shall not be less than one-quarter inch high. Attach to fixed surface adjacent to each instrument. Label all devices on monitoring panel and room instruments. Label shall indicate device's operating range, normal setting (or reading), and function of device. All wiring shall be labeled and indexed as indicated on the control drawings.

END OF SECTION 23 09 00
SECTION 23 21 23 - CENTRIFUGAL PUMPS

PART 1 GENERAL

1.1 DESCRIPTION

A. The work under this section includes furnishing and installing pumps for the project. Provisions of this section apply to all mechanical specification sections.

B. OTHER SECTIONS of these specifications are a part of this section. Refer to all other sections for a complete description of the work.

1.2 SUBMITTALS

A. Submit pump curves and documentation to show specifications compliance for each pump.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. The pumps shall be directly driven through a flexible coupling by a ball bearing TEFC electric motor. The motors shall be rated for continuous duty and shall be of sufficient size for the pump to operate 125% of the design GPM water flow on the pump curve without the motor's exceeding its nameplate rating. Unless otherwise scheduled, motor speed shall not exceed 1750 rpm. See 230500 ELECTRICAL, for additional motor requirements. Motor shaft shall be carbon steel and of a size and design to limit shaft deflection at the stuffing box to no more than .002 inches. Motor bearing shall be grease lubricated and sized for minimum of 20,000 hours B10 life which is equivalent to 100,000 hours average bearing life. The impeller diameter shall not exceed 85% of the cut water diameter of the voltage as measured through the centerline of the shaft. Pump and impeller selections for all air conditioning and heating water pumps shall be capable of delivering not less than 125% of design GPM at a reduced head point on the impeller curve. Selections of pumps where 125% of design flow on the pump curve fall outside of the recommended pump range will not be accepted. Pumps shall also be capable of delivering rated flow at 125% of scheduled head at scheduled flow by changing impellor size only.

B. End suction pumps shall have Woods "Sure-Flex" couplings or approved equal by Dodge or Falk. Couplings shall be equipped with safety guards. All components of the pumps, including the motors and couplings, shall be especially selected to assure quiet operation, free of excessive vibration in the opinion of the Architect. Pumps and motors shall be mounted on a common cast iron or steel bed plate. Pumps in variable speed applications shall be provided with a flexible coupling rated for variable speed/variable torque applications over full range of pump operation. The pumps shall be Taco, Bell & Gossett, Paco, Pearless, and Weiman.
C. All pumps shall be suitable for the service for which they are installed. Special attention shall be given to suction pressure, discharge pressure and NPSH of the system where installed.

D. Vertically arranged end suction pumps shall be furnished with cast iron pump base. End suction pumps shall have suction elbow cast with the base; the base shall support the pump and the pump shall support the motor. Adequate means of maintaining motor shaft, coupling, and pump shaft alignment shall be provided by keys, rabbet fitting or motor to mounting bracket, or other approved methods. All bearings of vertically arranged pumps and motors shall be designed for the vertical loads imposed by the arrangement.

2.2 END SUCTION PUMPS

A. The pumps shall be of the base mounted type, end suction centrifugal pumps, with cast iron body, bronze impeller, corrosion resistant steel shaft, bronze or stainless steel shaft sleeves, mechanical seals and grease lubricated ball bearings. The pumps shall be constructed for a working pressure of not less than 150 psig on the discharge side of the pump and not less than 100 psig on the suction side of the pump. If pumps are designed for very high efficiencies depending upon very close tolerances between impeller and casing, bronze wearing rings shall be provided on both casing and impeller.

2.3 INLINE PUMPS

A. The pumps shall be in-line type circulators, iron body, bronze trimmed, with sleeves bearings and mechanical seals, suitable for a working pressure of 125 psig. The pumps shall be of the type, size, capacity, etc. as indicated on the drawings, as manufactured by Taco, Peerless, Paco, or Bell & Gossett.

2.4 ENERGY EFFICIENT A-C INDUCTION MOTOR

A. The induction motor shall be an "energy-efficient" type and shall conform to the latest applicable standards of NEMA, IEEE, ANSI, and NEC.

B. Only motors meeting or exceeding the NEMA MG1 table 12-6 efficiency standard shall be acceptable. The NEMA nominal efficiency index shall be provided on the motor nameplate in accordance with NEMA standard MG 1-12.54.2.

C. Motors shall have Class F insulation and shall be designed for continuous-duty operation on AFC power. Nameplate service factor shall be 1.15. Design "A" or design "B" motors are acceptable.

D. Motors shall have all cast-iron construction. Rolled steel or aluminum enclosures shall not be acceptable. Maximum sound pressure shall be 88 DBA at three feet from motor.

E. The motor shall be "Duty Master XE" motor, as manufactured by Reliance Electric, or approved equals.
PART 3 EXECUTION

3.1 MANUFACTURER’S RECOMMENDATIONS

A. All pumps shall be installed in strict accordance with the recommendations of the manufacturer.

3.2 END SUCTION PUMPS

A. End suction pumps and motor bed plates shall be installed on a concrete pad.

B. The piping shall be arranged so that no strain is placed on the pump.

C. The pumps shall be placed in proper alignment and secured to the concrete pad before piping is connected.

D. The pump installation and alignment, including grouting in of the base, shall be performed under the direct supervision of and according to the recommendations of a qualified representative of the pump manufacturer.

E. Pumps shall be re-aligned after final setting and prior to any operation of pump.

3.3 INLINE PUMPS

A. Inline pumps shall be installed so that the weight and forces of the piping system shall not be transmitted to the pump.

END OF SECTION 23 21 23
SECTION 23 22 13 - STEAM PIPING

PART I GENERAL

1.1 GENERAL REQUIREMENTS
   A. Section 230200 applies to this section, with the additions and modifications specified herein.
   B. Section 230503 applies to this section, with additions and modifications specified herein.

1.2 SCOPE
   A. The work includes providing new steam piping systems. Provide each system complete and ready for operation. Equipment, materials, installation, workmanship, examination, inspection, and testing shall be in accordance with ANSI B31.1, except as modified herein. Design pressure and temperature ratings shall be in accordance with ANSI B16.5 for steel components. In ANSI B31.1, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. System components, including valves and accessories, shall be steel body suitable for minimum working pressure of ANSI Class 150 for steam piping and ANSI Class 300 for condensate piping.

1.3 INSULATION
   A. Provide under this section as specified in Section 230700.

PART 2 PRODUCTS

2.1 PIPING
   A. Steam Pipe
      1. ASTM A 53: Type E (electric-resistance welded, Grades A) or Type S (seamless, Grades A); black steel, Weight Class STD (Standard) for all pipe sizes.
      2. ASTM A 106: Grades A or B, black steel, Schedule No. 40 for pipe sizes through 10 inches, and minimum pipe wall thickness of 0.375 inch for pipe sizes 12 inches and larger.
      3. All piping shall be domestic manufacture only.
   B. Condensate Pipe:
      1. ASTM A 53: Type E (electric-resistance welded, Grades A) or Type S (seamless, Grades A); black steel, Weight Class XS (Extra Strong) for all pipe sizes.
      2. ASTM A 106: Grades A or B, black steel, Schedule No. 80 for pipe sizes through 10 inches.
      3. All piping shall be domestic manufacture only.
2.2 FITTINGS

A. Threaded Fittings: ANSI B16.11, or ANSI B16.3, Class 150 for steam, Class 300 for condensate. All threaded fittings shall have high temp “anti-seize” applied.

B. Socket Welding Fittings: ANSI B16.11.

C. Butt welding Fittings: ANSI B16.9, of the same material and weight as the piping in which fittings are installed. Backing rings shall conform to ANSI B31.1 and be compatible with materials being welded.

D. Eccentric Reducing Fittings: ANSI B16.9, of the same material and weight as the piping in which fittings are installed. Provide for changes in horizontal steam piping sizes.

E. Flanges and Unions: Provide at valves, traps, strainers, and connections to equipment.

F. Flanges: ANSI B16.5, Class 150 or 300 as required.


H. Gaskets, Bolts, and Nuts

1. Gaskets: ANSI B16.21, Class 150 flextallic spiral wound or equal for steam, Class 300 flextallic spiral wound or equal for condensate
2. Bolts: ASTM A 193, Grade B8. Bolts shall extend no less than two full threads beyond the nut with the bolts tightened to the required torque.
4. Washers: ASTM F 436, flat circular washers; provide under bolt heads and nuts.
5. Electrically Isolating (Insulating) Gaskets for Flanges:
   6. Provide ASTM D 229 electrical insulating material of 1000 ohms minimum resistance. Provide insulating gaskets between flanges. Provide silicon-coated fiberglass insulating sleeves between the bolts and the holes in flanges; bolts may have reduced shanks of a diameter not less than the diameter at the root of threads. Provide 0.125 inch thick high-strength insulating washers next to flanges and provide flat circular steel washers over insulating washers and under bolt heads and nuts. Provide bolts 0.5 inch longer than standard length to compensate for the thicker insulating gaskets and the washers under bolt heads and nuts.

I. All fittings shall be domestic manufacture only.

2.3 WELDING

A. ANSI B31.1, metallic arc process, including qualification of welders.
2.4 VALVES

A. Provide valves with stems horizontal or above. Valves shall have flanged end connections, except sizes smaller than 2.5 inches may have union end connections, or threaded end connections with a union on all but one side of the valve. Provide valves 8 inches and larger with globe valve bypass. Valves shall be steel body suitable for minimum working pressure of ANSI Class 150 for steam and Class 300 for condensate. No “piston” style check valves to be used in condensate system.

1. Gate Valves, Globe Valves, and Angle Valves: ANSI B16.34, steel body, minimum of ANSI Class 150 for steam and Class 300 for condensate. Crane, Kitz or equal.
2. Check Valves: steel body, minimum of ANSI Class 150 for steam and Class 300 for condensate. Crane, Kitz or equal.
3. Steam Pressure Regulating Valves: steel body, minimum of ANSI Class 150 for steam and Class 300 for condensate except as specified otherwise. Valve seats and disc shall be of replaceable heat-treated stainless steel. Valves shall be single seated, shall seat tight under dead end conditions, and shall move to the closed position in the event of pressure failure of the operating (controlling) medium. Provide strainer in inlet from external operating (controlling) medium. Valves shall be controlled by pilot valve with strainer at inlet from external pressure sensing piping. Valves shall be internally or externally steam traced for freeze protection. Valves shall be piston operated type or spring loaded diaphragm operated type with stainless steel springs. Spence or equal
4. Safety-Relief Valves: steel body, minimum of ANSI Class 150 for steam and Class 300 for condensate, with test lever and shall be suitable for the intended service. Kunkle or equal.

2.5 PIPING ACCESSORIES

A. Pipe Hangers and Supports: Provide MSS SP-58 and MSS SP-69, Type 43, of the adjustable type, except as specified or indicated otherwise. Provide Type 39 insulation protection saddles for insulated piping. Provide steel support rods. The finish of rods, nuts, bolts, washers, hangers, and supports shall be zinc-plated after fabrication. Cast-iron rollers, bases, and saddles may be painted with two coats of heat-resisting aluminum paint in lieu of zinc-plating. Provide stainless steel axles for cast-iron rollers.

B. Strainers: Construct of steel in accordance with ANSI B16.5 for minimum of ANSI Class 300. Provide stainless steel strainer element with 0.031-inch minimum diameter perforations. Provide blow-off outlet with pipe nipple and gate valve.

C. Traps: steel body, minimum of ANSI Class 150 for steam and Class 300 for condensate and of the types indicated. Traps shall have internals of stainless steel. Spirax Sarco or equivalent.

D. Gages: ANSI B40.1, single style pressure gage for steam with 4.5-inch dial, brass or aluminum case, bronze tube, gage cock, pressure snubbers, and syphon. Scale range shall be suitable for the intended service. Mid-range should be the working pressure.
PART 3 EXECUTION

3.1 INSTALLATION

A. Installation of steam piping systems including equipment, materials, installation, workmanship, examination, inspection, and testing shall be in accordance with ANSI B31.1, except as specified or indicated otherwise. Install piping straight and true. Install valves with stems horizontal or above.

B. Cleaning of Piping: Keep the interior and ends of new piping and existing piping affected by the Contractor's operations thoroughly cleaned of water and foreign matter. Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of pipe and fittings to prevent entry of water and foreign matter. Inspect piping before placing into position.

3.2 PIPING

A. Inspect, test, and approve piping before covering or concealing. Provide fittings for changes in direction of piping and for connections. Reducing branch connections in steel piping may be made with forged branch outlet reducing fittings for branches two or more pipe sizes smaller than mains. Branch outlet fittings shall be forged, flared for improved flow where attached to the run, reinforced against external strains, and designed to withstand full pipe bursting strength. Stab type connections will not be permitted. Jointing compound for pipe threads shall be polytetrafluoroethylene (PTFE) pipe thread tape, pipe cement and oil, or PTFE powder and oil. Pipe nipples 6 inches long and shorter shall be Schedule 80 steel pipe. Make changes in piping sizes through reducing fittings; bushings will not be permitted. Changes in direction of piping may be made with a hydraulic pipe bender; bent pipe showing kinks, wrinkles, or malformations will not be acceptable. Condensate pipe shall include drip, vent, relief, and gage connecting pipe.

B. Fittings and End Connections: Sizes less than 1.0 inch shall have threaded fittings and end connections. Sizes 1.0 to 2.0 inches shall have threaded fittings and end connections; provide threaded connections for threaded valves, traps, strainers, and threaded connections to equipment. Sizes 2.5 inches and larger shall have butt welding fittings and end connections; provide flanged connections for flanged valves, traps, strainers, and flanged connections to equipment.

3.3 NAMEPLATES

A. Provide nameplates for equipment, gages, thermometers, and valves. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25 inch high normal block style. Each inscription shall identify the function. Equipment nameplates shall show the following information.

1. Manufacturer, type, and model number
2. Capacity or size
3. System in which installed
4. System which is controlled
3.4 FIELD TESTING

A. Before final acceptance of the work, test each system as in service to demonstrate compliance with contract requirements. Before insulation is applied, hydrostatically test each piping system at not less than 200 psig in accordance with ANSI B31.1, with no leakage or reduction in gage pressure for 4 hours. Thoroughly flush and clean piping before placing in operation. Flush piping at a minimum velocity of 8 fps. Correct defects in work provided by Contractor and repeat tests until work is in compliance with contract requirements. Furnish potable water, electricity, instruments, connecting devices, and personnel for the tests.

END OF SECTION 23 22 13
SECTION 23 30 40 - HEAT TRANSFER EQUIPMENT

PART 1 GENERAL

1.1 DESCRIPTION

A. The work covered by this section of the specifications shall consist of furnishing and installing all air units, water specialties and water heating systems.

B. Other sections of these specifications are a part of this Section. Refer to all sections for a complete description of the work.

1.2 SUBMITTAL

A. Shop drawings shall be submitted as specified in Division 23. Shop drawings shall include sufficient information to prove complete compliance with the contract documents. Shop drawings on all items are required.

B. Submittals on coils may be submitted as part of the air handling unit submittal.

C. Shop drawings on all packaged units shall consist of manufacturer's literature and other information required establishing contract compliance. Wiring diagrams especially prepared for this project and showing all modifications required to interlock the unit as specified shall be submitted. The sensible and total cooling and/or heating capacity of each unit when operating at the specified conditions shall be clearly indicated.

D. Submit sound power levels for all air units with fan capacity exceeding 9000 CPM or having motors in excess of 5HP. Submit data on smaller units where the 2nd, 3rd or 4th band sound power level exceeds 65 dB. Data shall include discharge, radiated and intake.

1.3 QUALITY CONTROL

A. All cooling and/or heating coils shall be ARI certified.

B. Packaged units shall be UL labeled.

C. The capacity of all packaged units shall be tested and certified by ARI or AHAM.
PART 2 PRODUCTS

2.1 STRAINERS

A. Basket type strainers shall be cast iron body, bolted cover, closed bottom strainer basket, with flanged connections and shall be McAlear No. 528 suitable for 150 psi working pressure, or approved equal.

B. Y-type strainers shall be brass body with brass baskets, with bottom blow-off connection, for 150 psi W.W.P., and shall be McAlear "S" or "F-1" or approved equal. Strainers 2 inches and smaller shall be screw pattern; strainers 2-1/2 inches and larger shall be flange pattern.

C. Suppliers of Comparable Products: Muller.

2.2 AUTOMATIC AIR VENTS

A. Automatic air eliminator valves for use on air separators shall be high capacity float type with back flow prevention feature to prevent air from being drawn into system. 125 psig working pressure at 240 degrees F, 3/4" inlet, 1/4" orifice, 3/8" discharge connection, self-cleaning, 2 psig minimum operating pressure, cast iron body, removable cover, bronze mechanism. Amtrol, Taco, Armstrong Pumps, Sarco, Hoffman or Armstrong Trap Co.

2.3 THERMOMETERS AND THERMOWELLS

A. Thermometers shall be installed at locations indicated on the drawings and as indicated herein. Thermometers shall be installed in a manner that they may be easily read from the floor and shall be the separable socket type. Thermometer wells shall be provided for each thermometer. The thermometer wells shall be constructed of brass and shall be provided with brass plugs and chains. All wells for insulated lines shall be provided with lagging extensions. The thermometers shall be for bottom or back connections as required for each reading and shall be as follows:

1. Thermometers shall be selected with scales so that "normal" temperature is in the mid range as approved by the Architect.
2. Thermometers shall be Treice, 9" scale, cast aluminum case and brass stem. Minimum 3-1/2" stem complete with separable brass socket well.

B. Thermometers shall be placed as shown on drawing details and at the following locations:

1. Supply and return header take-offs for hot water loop.
2.4 PRESSURE GAUGES AND TAPPINGS (Water)

A. Tappings for pressure gauges shall be provided on the entering and leaving side of each pump and elsewhere as shown on the drawings or specified. Gauge tappings shall consist of a nipple welded or screwed into the piping, a gauge cock, nipple, and a brass cap. The gauge cocks shall be serviceable brass needle valves, Trerice No. 735-2. Cap shall be secured at tapping with a short section of brass chain. The exact location of gauge tappings shall be approved by the Engineer before installation.

B. Pressure gauge shall be installed on the house side of the domestic water isolation valve at the main riser.

C. Pressure gauge shall be installed on the house side of the HVAC hot water supply and return lines at the main risers.

D. Gauges shall be the Bourdon tube type with a 4-1/2" white dial with black graduations and with aluminum case with glass front. The gauges shall be installed in a manner so that they may be easily read from the floor and each gauge shall be provided with a lever handle cock. Provide brass pressure snubber for each pressure gauge. Gauges shall be Trerice, unless otherwise noted:

1. Water gauges for pump suction shall be compound gauges, range 30" Hg to 100 psi, model 600C.
2. All other water gauges shall be with a range of 0 to 160 psi, model 600C.
3. Gauges for general plumbing service, model 0-100 psi 600C.
5. Provide additional gauge cocks for use with the Energy Management System at the entering and leaving side of each pump.

E. Suppliers of Comparable Products: Ashcroft, Taylor.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. All Equipment shall be installed as recommended by the manufacturer. The equipment shall be cleaned, adjusted, balanced and placed into operation.

B. Water coils shall be installed as required to prevent trapping of air in the coil.

3.2 FLOW MEASURING EQUIPMENT

A. The flow metering equipment shall be installed as recommended by the manufacturer.
B. Arrange the piping systems to provide the required lengths of straight pipe before and after the measuring elements. Elbow installations are not acceptable. Accuracy of not less than 1-1/2% will be required.

END OF SECTION 23 30 40
SECTION 23 57 00 - PACKAGED HEAT TRANSFER SYSTEM

PART 1 GENERAL

1.1 GENERAL

A. Domestic System: Provide a fully assembled, packaged, and skid mounted steam fired domestic hot water heating system for domestic potable water service. Unit will be sized to heat 45 GPM of water from 40 F to 140 F using 35 psig saturated steam at 280F.

B. Industrial System: Provide a fully assembled, packaged, and skid mounted steam fired domestic hot water heating system for industrial potable water service. Unit will be sized to heat 170 GPM of water from 40 F to 140 F using 35 psig saturated steam at 280F.

1.2 REFERENCED STANDARDS

A. Hydraulic Institute
B. ANSI - American National Standards Institute
C. NEMA - National Electrical Manufacturers Association
D. L – 508 Industrial Control Panels
E. UL - QCZJ Packaged Pumping Systems
F. ETL - Electric Testing Laboratories
G. NEC - National Electrical Code (NFPA 70,) current edition
H. IEC - International Electrotechnical Commission
I. ISO - International Standards Organization
J. ASME B31.9
K. ASHRAE 90.1-2007

1.3 SUBMITTALS

A. General: In addition to the following, comply with the requirements of Division 1 for submittals, warranty and project closeout procedures.
B. Furnish installation, operation and maintenance (IOM) manuals on all equipment components, scaled and dimensioned fabrication drawings, sequence of operation for controls furnished, complete power wiring, control wiring and piping diagrams all as required for a complete explanation and description of all items of equipment. Include a copy of the standard startup and service reports to be used on each packaged system furnished and tentative service schedule based on the contract completion date (CCD).

C. Furnish pump curve for the pump. The pump curve shall show as a minimum; bhp, motor characteristics, flow, total dynamic head, impeller diameter and system curve. Furnish a system profile analysis including constant speed and variable speed pump curves and system curve. The analysis shall also include pump, motor and AFD (where applicable) efficiencies, job specific load profile, staging points, horsepower and kilowatt-hour consumption. Submittals must be specific to this project. Generic submittals will not be accepted.

D. Furnish computer selections for the Heat Exchanger that, as a minimum, contain flow, pressure drop, temperatures (rise & drop), fouling factor, and other items as indicated by the schedule for each side of the heat exchanger.

E. All information submitted shall be individually "tagged" to easily identify it with the item of corresponding material or equipment that is being submitted. Failure to comply with the aforementioned requirements will result in that item, or, at the discretion of the Engineer, all items being rejected without being reviewed until such time as these conditions are satisfied.

F. Provide all submittal information inclusive of fabrication drawings for review by the Engineer in accordance with the requirements of Division 1.

G. Approved suppliers to be Cleavor Brooks, Thermaflo or approved equal.

1.4 FABRICATION DRAWINGS

A. As part of the aforementioned submittal requirements, provide AutoCAD 2000 or later dimensioned fabrication shop drawings as specified; detailing major elements, components, and systems included as part of the packaged pumping module. Provide, as a minimum, two scaled and dimensioned elevations indicating outside dimensions of the frame, piping and electrical connections.

1. Include the following:
   a. Clearances for operating, servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
   b. Equipment connections and support details.
1.5 QUALITY ASSURANCE

A. The manufacturer shall assume “Unit Responsibility” for the complete package. Unit responsibility shall be defined as responsibility for the interface and successful operation of all components supplied by the manufacturer. The manufacturer shall assemble the package. The manufacturer must be actively engaged in the design and fabrication of the packaged system being assembled.

B. The manufacturer must have dedicated and qualified service/startup division for all components provided as part of the packaged systems.

C. The manufacturer of the packaged system must be an authorized manufacturer’s representative or reseller for all major components of the packaged system.

D. Underwriter’s Laboratories shall list the manufacturer as a manufacturer of packaged pumping systems.

E. The manufacturer shall have not less than 5 years demonstrated and documented experience in the design, fabrication, testing and startup/servicing of packaged systems.

F. ASME Section IX certified welders shall perform all welding of the piping.

G. The manufacturer shall run test the completed packaged assembly at the factory for not less than 2 hours prior to shipment.

H. Bidders shall comply with all sections of this specification relating to Packaged Pumping Module. Deviations from this specification shall not be permitted.

I. The contractor and Packaged Pumping Module Manufacturer shall be bound by these specifications.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to the site so they arrive in the same condition as when they left the factory.

B. Prior to shipping, all open pipe connections shall be provided with protective ends caps to ensure that dirt, debris and other foreign matter are not introduced into the piping systems.

C. The entire packaged system shall be factory assembled, tested and shipped.
1.7 WARRANTY & SERVICE

A. The entire packaged assembly, inclusive of all components shall be fully warranted (full parts and labor) by the manufacturer against defects in workmanship and operation for a period of eighteen months from the date of shipment.

B. The manufacturer shall guarantee in writing a response time of one (1) business day or less to calls for warranty and or service related emergencies.

C. An authorized local service vendor of the manufacturer may perform the initial service call for diagnostic purposes.

D. The manufacturer shall provide a 24-hour toll free emergency service hot line.

PART 2 PRODUCTS

2.1 Heat Exchanger: The heat exchanger will be a counter current flow stainless steel plate and frame heat exchanger. The heat exchanger will be designed and manufactured to ASME Section VIII Division I, including U-stamp and National Board Registration. Code calculations and material certifications are available upon request. The unit will have a design pressure of 150 psig, and a design temperature of 300F. The heat exchanger will be constructed from double wall 316L stainless steel plates that are 0.60 mm thick. The double wall plates separate the fluid streams and are vented to atmosphere. Mechanically fixed EPDM gaskets will be provided.

2.2 Condensate Removal: Condensate will be removed from the heat exchanger utilizing a closed loop condensate pump trap. The pump trap will act as a pump during stall conditions, a trap during non-stall conditions, and will ensure condensate removal under all operating conditions.

2.3 Materials of Construction: Steam and condensate will be identified as the primary side of the system. Domestic potable water will be identified as the secondary side of the system. Primary side piping will be constructed from A105 carbon steel. Control valves and isolation valves will be either cast steel or forged steel. Condensate pump trap will be ductile iron. Secondary side piping will be constructed from 304L stainless steel. All secondary side components that will contact the potable water are lead free.
Please see Table 1 for a breakdown of construction materials by size.

<table>
<thead>
<tr>
<th>Service Side</th>
<th>Pipe Material</th>
<th>Fitting Material</th>
<th>Connection</th>
<th>Valve Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Side &lt;2&quot;</td>
<td>A106 CS Sch. 80</td>
<td>A105 FS</td>
<td>NPT or SW</td>
<td>Forged or Cast Steel</td>
</tr>
<tr>
<td>Primary Side &gt;2&quot;</td>
<td>A106 CS Sch. 40</td>
<td>A234 A105</td>
<td>BW Flanged</td>
<td>Cast Steel</td>
</tr>
<tr>
<td>Secondary Side &lt;2&quot;</td>
<td>304 L SS</td>
<td>A182 Forged SS</td>
<td>NPT or SW</td>
<td>Lead Free</td>
</tr>
<tr>
<td>Secondary Side &gt;2&quot;</td>
<td>304 L SS</td>
<td>A312 A182</td>
<td>BW Flanged</td>
<td>Lead Free</td>
</tr>
</tbody>
</table>

Table 1 – Materials By Size

2.4 Inclusive Pipework: The steam side of the heat exchanger will be supplied with a pneumatic shutoff valve for over-temperature protection of the secondary side, a control valve for temperature regulation of the secondary side, and required piping to connect these components to the heat exchanger. Manual isolation valves, drip legs, and pressure reducing stations are optional and can be supplied, but are not part of this specification. The condensate side of the heat exchanger will be supplied with a condensate pump trap. The condensate pump trap will come fully piped including appropriately sized receiver, isolation valve, motive steam piping with drip leg, exhaust piping, and inlet/outlet check valves. An optional manual isolation valve can be supplied at the outlet connection, but is not included in this specification. The secondary side piping on the heat exchanger will include pressure and temperature relief valves, an over-temperature solenoid valve, circulation pump and piping, outlet temperature sensor, and vent and drain valves. Optional manual isolation valves can be supplied on the secondary inlet and outlet connections, but are not included in this specification.

2.5 Controls: The heat exchanger package will include a universal PID process controller with full color display. The controller will monitor outlet water temperature using the secondary side RTD connected to the universal input of the controller. An analog output from the controller will provide a modulated control signal to the control valve. The control valve will regulate steam flow to maintain the required temperature set point. The control valve will be pneumatically actuated. An optional electric actuated control valve can be supplied. The controller will close the steam shutoff valve and open the over-temperature hot water solenoid dump valve above the high limit set point. The controller will automatically reset once the temperature returns to an acceptable range. The controller will be mounted in a NEMA 4 enclosure with a green power on light and a red over-temperature light. The following information is accessible from the controller:

- Outlet Temperature
- Set Point
- Control Valve Output Signal
- Over Temperature Alarm Set Point
**Electrical Supply:** 120 V AC / 60 Hz  
**Pneumatic Supply:** 80 psig

**Safety:**
- All secondary side components that contact the potable water are lead free.
- A pneumatically actuated ball valve, independent of the temperature control valve, is provided to shut off the steam to the heat exchanger in case of a high temperature alarm. The ball valve is rated as bubble tight shutoff.
- A pneumatically actuated ball control valve is supplied to modulate the steam supply. The control valve is complete with positioner, and has bubble tight shutoff.
- An over temperature solenoid is provided to dump the hot water from the system in case of a high temperature alarm.
- Once the outlet temperature returns to an acceptable range, the actuated ball valve will re-open and the over temperature solenoid will close.
- Pressure relief and pressure and temperature relief valves are provided on the secondary side.
- All components will be installed, wired, hydrostatically tested, and dry function tested prior to shipping.

PART 3 EXECUTION

3.1 UNIT INSTALLATION

A. The contractor shall set in place and anchor the Packaged Module in accordance with the written recommendations of the manufacturer of the Packaged Pumping Module. Packaged Module base with pre-aligned pumps shall be installed level without stress. Pump alignment shall be rechecked by the contractor.

B. The contractor shall make all piping connections to the Packaged Module’s connections provided, all in accordance with the written recommendations of the manufacturer of the Packaged Module. Piping connections shall not allow piping stress to be transferred to the Packaged Module during installation or operation.

C. Power wiring, as required, shall be done in accordance with the division of responsibility as specified elsewhere. All power wiring shall be performed per the current edition of the NEC (NFPA 70.)

D. Remote differential pressure transmitters and flowmeters furnished with the packaged pumping system shall be installed by the mechanical contractor per the manufacturer’s instructions. A three valve bypass shall be installed for each differential pressure transmitter per the submittal drawings.

E. Flow transmitters shall installed by the mechanical contractor. The flow transmitter shall be installed according to the manufacturer’s instruction with particular attention to straight pipe requirements, direction of flow, and insertion depth.
F. Control wiring for remote mounted differential pressure switches, differential pressure transmitters, flow transmitters, start/stop commands, alarms etc. shall be the responsibility of the control contractor. All control wiring shall be performed per the current edition of the NEC (NFPA 70.)

3.2 START-UP

A. The system manufacturer or factory-trained representative shall provide start-up of the packaged pumping system. This start-up shall include verification of proper installation, system initiation, adjustment and fine tuning. This jobsite visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed-off on the manufacturer's start-up request form.

B. Remove Suction Diffuser Start-Up Strainer after system has been running for 48 hours.

3.3 CLEANING

A. Entire Package shall be thoroughly cleaned after installation.

3.4 TRAINING

A. The system manufacturer or factory trained representative shall provide on-site training for owner's personnel. This training shall fully cover maintenance and operation of all system components. The system manufacturer must have a complete HVAC training program available for this purpose.

END OF SECTION 23 57 00
SECTION 26 05 00 – ELECTRICAL, GENERAL

PART 1 - GENERAL

1.1 FEES
   A. Fees for permits and inspections are included. Deliver permits and certificates to the Owner.

1.2 SITE VISIT
   A. Prior to bidding, this Contractor shall visit the job site and shall familiarize himself with all conditions under which work is to be performed and shall include in his bid all labor, material and operations required for a complete job.

1.3 DRAWINGS AND SPECIFICATIONS
   A. Drawings do not indicate all hardware and fittings. Examine all plans and specifications for the project and conditions at site and arrange work accordingly, furnishing required fittings and hardware without extra charge. If a conflict exists, the greater quantity or better quality, in the opinion of the Engineer, governs.

   B. Drawings and specifications are complementary; work called for in either shall be provided as if called for by both.

1.4 CODES AND STANDARDS
   A. Materials, equipment and installation shall conform to the requirements of the codes and standards (latest editions) listed below. In addition, all materials, equipment, and devices shall meet the requirements of the Underwriters' Laboratories, Inc. The label of, or listing by, the Underwriters' Laboratories, Inc. will be accepted as conforming with this requirement. In lieu of the label or listing, the Contractor may submit independent proof satisfactory to the Engineer that the materials, equipment or devices conform to the published standards, including methods of tests, of the Underwriters' Laboratories, Inc. (UL), National Electrical Code (NEC), National Electrical Safety Code, American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Institute of Electrical and Electronics Engineers (IEEE), National Electrical Manufacturers Association (NEMA), Illuminating Engineering Society (IES), National Fire Protection Association (NFPA), National Electrical Contractors Association Standard Practices for Good Workmanship in Electrical Contracting (NECA 1), International Building Code (IBC), Americans with Disabilities Act (ADA), and South Carolina Department of Health and Environmental Control (SC DHEC).
1.5 BASIC MATERIALS AND METHODS
   A. All materials installed shall be new, clean, in good condition and shall meet applicable provisions of codes and standards listed above.
   B. Workmanship shall be in accordance with best practice.

1.6 SCOPE
   A. Provide all labor, equipment, material, and operations required for complete, safe and quietly-operating electrical systems in accordance with specifications and drawings and subject to terms and conditions of the contract.
   B. The work includes:
      1. Grounding in accordance with specifications, drawings and codes;
      2. Complete distribution system for power including panelboards, feeders, branch circuits, and connections to outlets and devices for power utilization;
      3. Empty raceways, cabinets, equipment panels, and service entrance for structured cabling equipment;
      4. Power supply connections to mechanical equipment;
      5. Cutting and patching as required for provision of the work;
      6. Fireproofing and caulking as required;
      7. Seismic restraint for electrical system components;
      8. Partial Demolition of existing electrical system.

1.7 CUTTING AND PATCHING
   A. Provide under this contract all cutting and patching of walls, floors, partitions, ceilings, etc. required for proper installation of the new system.
   B. Provide patching to match the existing finish of the building. Do not cut joists, beams, girders, columns, or other structural members without written permission from Owner.
   C. Ceiling tile shall be removed and reinstalled by a qualified franchised acoustical tile contractor regularly engaged in this type of work. Replace damaged tile with new tile of color and pattern to match existing tile. Submit samples for approval.
   D. Relocation of existing conduit, equipment, wiring, etc. as required for installation of new system is included in this work. Perform all work in accordance with specifications for new work of the particular type involved.

1.8 ROOF PENETRATIONS
   A. Contractor shall coordinate roof penetrations with other trades and shall provide all work required for complete raceways and raceway supports for electrical work for roof-mounted equipment and devices.
B. Provide flashing devices not included under other divisions of these specifications. All work shall comply with requirements for roof construction and shall in no way alter any specified roof performance or warranties.

C. Where several services (e.g., electrical and refrigeration) are connected to a single equipment, coordinate with other trades involved to minimize roof penetrations and to perform work in a workmanlike manner.

D. Lay out work in advance and locate raceway penetrations as near equipment connection points as possible. Where more than one raceway serves equipment, extend all raceways through a common flashing device with one roof penetration and leave sufficient space between raceways to affect a leakproof seal.

E. Contractor shall examine other divisions of these specifications and shall comply with all requirements for a complete project.

1.9 SEISMIC RESTRAINTS

A. Provide seismic restraint of new electrical systems and equipment as required by 2012 International Building Code (IBC). Seismic restraint products shall be by Cooper/B-line, Mason Industries, Unistrut Corporation, Grinnell Corporation, Amber Booth, Peabody or approved equal.

1.10 DAMAGES

A. Cost of repairing damage to building, building contents, and site during construction and guarantee period resulting from this work is a part of this contract.

1.11 MATERIAL AND EQUIPMENT

A. New and as specified, or approved equal.

B. Where several units of one type of equipment are used, all units shall be products of the same manufacturer.

C. Any increase in the cost of this work, resulting from substitution of any product or products for those specified is part of this contract. Such work shall be accomplished in an approved manner at no extra cost to the Owner.

1.12 REQUESTS FOR PRIOR APPROVAL

A. Requests for prior approval shall comply with AIA A701, Instructions to Bidders, Article 3.3, as modified by OSE Form 00201, Standard Supplemental Instructions to Bidders.

B. In addition, requests for prior approval shall include the following:

1. Date of request
2. Project Name as shown on bid documents  
3. Requesting Company’s Name (if not on letterhead)  
4. Summary sheet for lighting fixtures with same information required on shop drawing submittals.

1.13 OPERATING INSTRUCTIONS, PANELBOARD DIRECTORIES AND NAMEPLATES

A. Instruct owner in operation of all systems.

B. Install in each panelboard a single-sided plastic-covered, typewritten circuit directory in metal frame. Indicate name, address and service telephone number of installer. Directory shall list the load served and the location of the load for each breaker.

C. Nameplates Provided by Contractor: On all panelboards, disconnect switches, transformers and enclosures, provide engraved plastic laminate nameplates. Unless otherwise noted, nameplates to be 1/16" thick plastic with 1/4" high white letters on black background. Attach nameplates with epoxy cement or screws. On main switchboard/panelboard and feeder distribution panelboards, provide nameplate for each circuit breaker.

D. Nameplates Provided by Equipment Manufacturers: All switchboards, panelboards, transformers, safety switches and the like shall be provided with engraved metal nameplates which state all industry-standard required data about the labeled equipment. Nameplates shall be affixed with screws or rivets. The use of paper nameplates only will not be accepted.

1.14 SHOP DRAWINGS

A. The Engineer will review and take appropriate action on shop drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be only for general compliance with the design and with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. Engineer's review shall be conducted with reasonable promptness consistent with sound professional practice. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Engineer shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Engineer be required to review partial submissions or those for which submissions for correlated items have not been made.

B. Prior to submittal of shop drawings to the Engineer, the General Contractor and the Electrical Subcontractor shall review and approve shop drawings. Shop drawings which have not been reviewed and approved in writing by the Electrical Subcontractor will not be reviewed by the Engineer. Electrical Subcontractor shall state in writing on shop drawings, any proposed deviations from contract documents. Such deviations, if not stated in shop drawings submittal, shall be the sole responsibility of the Electrical Subcontractor.
NOTE: IN ADDITION TO THE GENERAL CONTRACTOR'S APPROVAL AND STAMP, THE FIRST PAGE OF EACH SHOP DRAWING SUBMITTAL SHALL CONTAIN THE WORDS "APPROVED" OR "APPROVED AS NOTED," AND SHALL BE SIGNED, AND DATED BY THE ELECTRICAL SUBCONTRACTOR BEFORE THE ENGINEER WILL REVIEW THEM.

C. Lighting fixture submittal shall contain a cover sheet listing:

1. Project name;
2. All proposed fixtures by symbol, manufacturer, and catalog number;
3. Contractor's approval stamp and signature as noted above.

Attach fixture catalog pages (cuts) to cover sheet.

D. Electrical subcontractor shall submit for review by the Engineer detailed shop drawings of all equipment and all material listed below. All submittal data shall be submitted at one time. Partial submittals will not be reviewed by the Engineer. No material or equipment for which Engineer's review is required shall be delivered to the job site or installed until this contractor has in his possession the reviewed shop drawings for the particular material or equipment. The shop drawings shall be complete as described herein. This Contractor shall furnish the number of copies specified by the Architect or six (6) copies of shop drawings if no number is specified by the Architect.

E. Shop drawings submitted for review shall be detailed, dimensioned drawings or catalog pages showing construction, size, arrangement, operating clearances, performance characteristics and capacity.

F. Samples, drawings, specifications, catalogs, submitted for review shall be properly labeled indicating specific service for which material or equipment is to be used, section and article number of specifications governing, contractor's name, and project name.

G. Catalogs, pamphlets, or other documents submitted to describe items on which review is being requested, shall be specific and identification in catalog, pamphlet, etc. of item submitted shall be clearly made in ink. Data of a general nature will not be accepted.

H. Review rendered on shop drawings shall not be considered as a guarantee of measurements of building conditions. WHERE DRAWINGS ARE REVIEWED, SAID REVIEW DOES NOT MEAN THAT DRAWINGS HAVE BEEN CHECKED IN DETAIL; SAID REVIEW DOES NOT IN ANY WAY RELIEVE THIS CONTRACTOR FROM HIS RESPONSIBILITY OR NECESSITY OF FURNISHING MATERIAL OR PERFORMING WORK AS REQUIRED BY THE CONTRACT DRAWINGS AND SPECIFICATIONS.

I. Failure of contractor to submit shop drawings in time for review by Engineer with reasonable promptness consistent with sound professional practice shall not entitle him to an extension of contract time, and no claim for extension by reason of such default will be allowed.

J. The Contractor shall submit shop drawings for the following materials and equipment for review by Engineer: See “Note” in paragraph B, above.
1. Safety switches
2. Seismic calculations and equipment
3. Basic materials: wire, conduit, fittings, wiring devices

1.15 RECORD DATA

A. Preserve one set of approved shop drawings and deliver to Owner prior to substantial completion of the work. Owner's shop drawings shall be bound in a 3-ring binder of good quality, with stiff vinyl or cloth front and back. Number of copies shall be as directed by Architect.

1.16 RECORD DRAWINGS

A. Contractor shall maintain on the job site one complete set of drawings for this project. All changes authorized by the Engineers and/or the Owner as to the locations, sizes, etc. of equipment, conduit, fixtures, and/or other material and equipment shall be indicated in red pencil on the drawings as the work progresses. At the completion of the project, Contractor shall obtain a complete set of reproducibles of the drawings, and shall transfer all changes to these reproducibles. The number of record prints specified by the Architect shall be delivered to the Architect.

1.17 COORDINATION WITH OTHER TRADES

A. Coordinate with other trades to conceal electrical work and provide electrical work in correct locations for each piece of mechanical or electrical equipment connected.

B. Conceal outlets for all water coolers, mechanical equipment, etc., in finished areas. Obtain roughing diagrams for all devices and install electrical work according to diagrams.

C. Locate all outlets at uniform heights to suit block coursing. Heights shown in drawings may be varied to suit coursing, but shall in all cases comply with codes.

1.18 ELECTRICAL WORK FOR MECHANICAL SYSTEMS

A. Provide complete power wiring and connections for mechanical systems specified under Division 15. This work includes all raceways, conductors, outlet and pull boxes, line voltage on-off switches where indicated and disconnecting means as indicated and required by applicable codes. Where magnetic motor starters, variable frequency drives or other controllers are furnished by others, install and wire complete; where controllers are provided already mounted on equipment, wire complete. In all cases provide power wiring through controller to load; do not reduce. Make all connections and color code per this division. Unless noted otherwise, safety switch enclosures shall be NEMA Type 3R outdoors and in wet locations; NEMA Type 1, elsewhere. Not included in this division is temperature control wiring, equipment control wiring, and interlock wiring required to operate the mechanical system, except as specified below for water heaters. Refer to Division 15 for equipment provided under that Division.
B. Where water heaters are equipped with circulating pumps, aquastats and other field-installed control or safety devices, wire complete including power and controls.

1.19 EQUIPMENT FOUNDATIONS AND MOUNTING

A. Unless otherwise noted, set all floor and ground mounted equipment on minimum 6” high concrete pads reinforced with 6 x 6, 10/10 WWM. Epoxy dowel #4 rebar 12” on center along entire perimeter of pad as required to tie pad into base slab. Pads to be approximately 6" larger than equipment base and have 1” x 1” chamfer on all edges. Pads to have carborundum brick rubbed finish. Surface finish to be uniformly smooth.

B. Provide all required mounting devices, hardware, supplementary steel and other materials to mount equipment. Mountings shall be secured to structure and seismically braced to comply with codes. Where additional structural members such as columns, beams, and the like are required to mount equipment, they shall be provided at no additional cost to the Owner.

1.20 TESTS, PERFORMANCE

A. Upon completion of work, the system shall be free of faults, including short circuits, grounds and open circuits and loads shall be balanced across phases to obtain minimum neutral current in all feeders and branch circuits. Test systems as required in the presence of the Engineer or his representative, and operate to comply with applicable codes and contract documents.

B. For all fire safety systems, test systems completely and exercise all user stations, initiation/activation stations and warning/output devices prior to substantial completion by the Engineer. Furnish certificate to Engineer stating that systems are complete and operational and have been operated by the Contractor as specified above.

C. All costs associated with correction of deficiencies in the work shall be borne by the Contractor. Defective material and equipment shall be replaced; do not repair.

D. All devices which must be adjusted or set to operate on a schedule (time clocks, program mechanisms, etc.) shall be set prior to substantial completion to operate on schedules directed by the Owner.

E. All adjustable breakers shall be adjusted in field to settings determined by an engineering coordination study as required to determine appropriate settings for optimal power distribution coordination. Include in bid all required work and engineering services as required for this study and adjustment.

F. Where lighting or other loads are indicated to be controlled through the energy management system (EMS), coordinate with mechanical contractor and EMS supplier and provide control voltages, contact forms, communication modules, and connection points to suit EMS inputs. Provide all required components for complete and operational system.
1.21 WARRANTIES

A. The Contractor Agrees:

1. To correct defects in workmanship, materials, equipment, and operation of all systems for a period of one year from the date of Substantial Completion.
2. To remove any item not specified or given written approval and replace it with an approved item.
3. That all systems provided will safely, quietly, and efficiently operate in accordance with the design.

B. This does not supersede manufacturer’s warranties which may extend beyond one year.

1.22 CONSTRUCTION SEQUENCE

A. The Contractor is cautioned that the project may be constructed in stages to accommodate the owner's use of the building. This contractor shall verify requirements prior to bidding and shall cooperate in all respects with other contractors and trades on the job to carry out the work with minimum disruption of both the owner's requirements and construction of the project.

1.23 DETAILS

A. The details and sketches in the drawings are construction standards applicable to this project.

B. The contractor shall comply with details as applicable to the work indicated and shall retain on the job site at all times, a complete set of drawings and specifications.

1.24 DEFINITIONS

A. In this division of the specifications and accompanying drawings, the following definitions apply:

1. Provide: To purchase, pay for, transport to the job site, unpack, install and connect complete and ready for operation; to include all permits, inspections, equipment, material, labor, hardware and operations required for completion.
2. Install: To receive from another contractor, the owner or another entity and install complete and ready for operation. Unless otherwise indicated, receipt is assumed to be at the job site.
3. Furnish: To purchase, pay for and deliver to the job site for installation by others.
4. The contractor is cautioned that “furnish” and “install” require coordination with others. Such coordination shall be accomplished prior to bidding and bid amounts shall include all required labor, material and operations for completion of all items and systems specified and indicated.
5. As Indicated: As shown in drawings.
PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 26 05 00
SECTION 26 05 10 -- ELECTRICAL, DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The following apply to the work under this Section:

1. Section 26 05 00, Electrical, General
2. Section 26 20 00, Interior Wiring Systems

1.2 SCOPE

A. Provide all labor, material and operation required for removal of existing electrical systems as indicated.

B. Bidders shall visit the site of the work prior to bidding and shall include in bid all work required to provide new work and to modify existing work as required to continue in operation.

C. Contractor shall examine demolition and new work plans for all trades and include in bid all rework and/or relocation of existing raceway, junction boxes, panelboards, safety switches, devices, wiring systems and all other related electrical equipment as required to accommodate new construction.

D. Electrical demolition work generally includes:

1. Panelboards, safety switches and other electrical equipment as indicated;
2. Exposed conduits, surface metal raceways and exposed outlet boxes and devices as indicated;
3. Conductors, exposed and concealed as indicated;
4. Existing wiring devices as indicated. Where new wiring devices are shown in existing locations, the Contractor may re-use the existing opening and outlet box for new device;
5. Any existing abandoned wiring systems in ceiling space, crawl space, attic or similar cavities of the work areas of the building, including wire, raceways, boxes and supports as indicated.
6. Existing electrical work for mechanical equipment being removed by others.
7. Where indicated on drawings, existing raceways may be reused for new circuits. Contractor shall mandrel brush and swab existing feeder conduits prior to pulling new conductors.

E. Include in bid all work required for temporary wiring and associated electrical work required to maintain existing systems in service during demolition phase.

F. All interruptions in electrical systems (power, lighting, communication, fire alarm and other systems) as required for this work shall be coordinated with and approved by Owner prior to performing work. Notice shall be provided to Owner in writing a minimum of 48 hours in
advance, but not less than the time specified in other portions of Contract Documents.

G. The intent of this specification is to obtain removal of the existing electrical system to the extent required to enable the Owner to identify, service, repair or modify the new wiring system efficiently and safely.

1.3 STANDARDS

A. Demolition work shall comply with ANSI A10.6, NFPA 241, OSHA, AHERA and all applicable local, state and federal standards and guidelines.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities in work area have been disconnected and capped as required.

B. Survey existing conditions and correlate with demolition and new work indicated in Contract Documents to determine extent of demolition required.

C. When unanticipated mechanical, electrical, environmental or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Provide prompt written notice to Engineer of any conflicts.

3.2 DEMOLITION

A. Owner shall retain first right of refusal on all electrical equipment being demolished. Prior to beginning demolition work, contractor shall walk through demolition area with Owner’s representative and identify items to be removed and turned over to Owner. Contractor shall carefully remove, protect and store items to be turned over to Owner and deliver to Owner at location on site as directed by Owner.

B. Maintain services and systems indicated to remain and protect them against damage during demolition process.

C. For all lighting being relocated, remove, clean, re-lamp and reinstall complete as indicated on new work plans.

D. All devices indicated as to remain or to be relocated shall be protected against damage during demolition process and cleaned prior to being restored into service.

E. Contractor shall patch all locations resulting from demolition at which new work is not installed, as required under Section 26 05 00, Electrical, General.
F. Provide temporary barricades, dust barriers and other protection required to prevent injury to people and damage to building contents, adjacent area of building and facilities to remain.

G. Maintain protected egress and access at all times. Do not close or obstruct roadways or sidewalks without permission from Owner.

H. Conduct demolition to minimize interference with Owner's use of site.

I. Conduct operations with minimum interference to public or private access.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

A. Demolished material shall be promptly removed from site as work progresses.

B. Remove and transport materials in a manner that will prevent contamination or damage to adjacent surfaces and areas.

C. Burning of demolished materials will not be permitted on site.

D. All materials shall be properly and legally disposed of. Contractor is responsible for all handling, storage, transportation and disposal fees.

3.4 CLEANING

A. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition operations.

B. Return adjacent areas to condition existing before demolition operations began.

END OF SECTION 26 05 10
SECTION 26 20 00 – INTERIOR WIRING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section 26 05 00, Electrical, General, applies to the work under this section.

1.2 SCOPE

A. Provide interior wiring systems complete and ready for operation, as indicated, specified herein and in compliance with applicable codes and standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Materials of like type shall be manufactured by the same company.

B. Circuit breakers, safety switches, motor starters, contactors and the like: General Electric, Siemens-ITE, Square D, Cutler-Hammer, or approved equal.

C. Fittings, Condulets, Boxes and the like: Steel City, Thomas and Betts, O-Z Electrical Manufacturing Company, Appleton, Efcor, Crouse-Hinds, Garvin Industries, or approved equal.

D. Conductors and Cables: Alpha Wire Company, Belden, Cerro Wire, Southwire Company, General Cable or approved equal.

E. Cable Markers: 3M Company, E-Z Code, Brady, or approved equal.

F. Connectors, Lugs and Terminals and the like: 3M Company, Ideal, Thomas and Betts, O-Z Electrical Manufacturing Company, or approved equal.

G. Wiring Devices and the like: Best Specification Grade; Arrow Hart/Cooper, Hubbell, Legrand/P&S, Leviton, or approved equal.

H. Fuses: Bussman, Gould, Littelfuse, or approved equal.

I. Grounding Devices, Rods and the like: Cadweld, Thomas and Betts, Appleton, Erico, O-Z Electrical Manufacturing Company, or approved equal.

J. AC and MC Cable: Only permitted for fixture “whips”, maximum 6’ length.
2.2 CONDUIT AND FITTINGS

A. Rigid Steel Conduit (Zinc-Coated): ANSI C80.1.

B. Rigid Nonmetallic Conduit: PVC Type EPC-40 in accordance with NEMA TC2.

C. Intermediate Metal Conduit (IMC): UL 1242, zinc-coated steel only.

D. Electrical Metallic Tubing (EMT): ANSI C80.3.

E. Flexible Metal Conduit: UL 1.
   1. Liquid-Tight Flexible Metal Conduit (Steel): UL 360.

F. Fittings for Metal Conduit, Electrical Metallic Tubing, and Flexible Metal Conduit: UL 514. All ferrous fittings shall be cadmium- or zinc-coated in accordance with UL 514.
   1. Fittings for rigid metal conduit and IMC shall be threaded type. Split couplings are not acceptable.
   2. Fittings for electrical metallic tubing (EMT) shall be the compression type.


H. Electrical Nonmetallic Tubing (ENT): Not permitted.

2.3 OUTLET BOXES AND COVERS

A. UL 514, cadmium- or zinc-coated if of ferrous metal.

B. Provide outlet boxes of size and type required by NEC, and in no case smaller than the following:
   1. Boxes for lighting fixtures: 4" octagonal x 1-1/2" deep, or 4" x 4" x 1-1/2"
   2. Boxes for Switches and Receptacles: 3" x 2" x 2-3/4" or 4" x 4" x 1-1/2" with plaster ring to suit construction
   3. Telephone boxes: 4" x 4" x 2-1/4"
   4. Communications Systems Boxes: 4" x 4" x 2-1/4"

C. Provide suitable extensions, rings or subcovers set to come flush with the finished surface in which boxes are mounted.

D. Boxes for exposed raceway shall be threaded-hub cast metal, sizes as specified above.

E. Floor Outlet Boxes: Boxes shall be adjustable and concrete tight. Each outlet shall consist of a metal body with openings for conduits, adjustable ring, flange ring, and cover plate. Gaskets shall be used where necessary to ensure watertight installation. See drawings for specific types.

2.4 CABINETS, JUNCTION BOXES, AND PULL BOXES

A. UL 50, hot-dip zinc-coated, code gauge sheet steel, screw cover unless indicated otherwise.
2.5 WIRES AND CABLES

A. Wires and cables shall meet the applicable requirements of NFPA 70 and UL for the type of insulation, jacket, and conductor specified or indicated. All wire and cable shall be new, with size, grade of insulation, voltage and manufacturer's name permanently imprinted on outer covering at regular intervals, and delivered to the job site in complete coils and reels.

B. Conductors: Conductors No. 10 AWG and smaller shall be solid, and those No. 8 AWG and larger shall be stranded. Unless indicated otherwise, conductor sizes shown are based on copper. All conductors shall be copper.

C. Minimum Conductor Sizes: Minimum size for branch circuits shall be No. 12 AWG; for Class 1 remote-control and signal circuits, No. 14 AWG; and for Class 2 low-energy remote-control and signal circuits, No. 16 AWG. All 120 v. branch circuits exceeding 100' in length and all 277 v. branch circuits exceeding 250' in length shall be No. 10 AWG, minimum.

D. Color Coding: Provide for all service, feeder, branch, control and signaling circuit conductors. Color shall be green for grounding conductors, and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, the neutral of the higher-voltage system shall be white with a yellow stripe, or shall be gray. The color of the ungrounded conductors for 120/208 volt, 3-phase shall be: Phase A – black, Phase B – red, Phase C – blue.

E. Color coding for fire alarm conductors shall be the manufacturer’s standard and shall be consistent throughout the system. Include color coding key with record data.

F. Insulation: Unless specified or indicated otherwise, or required to be otherwise by NFPA 70, all power and lighting wires shall be 600-volt, Type THHN, THWN, or XHHW; remote-control and signal circuits shall be Type TW, THHN, TF, THWN or XHHW.

G. Bonding Conductors: ASTM B 1, solid bare copper wire for sizes No. 8 AWG and smaller; ASTM B 8, Class B, stranded bare copper wire for sizes No. 6 AWG and larger.

H. Variable Frequency Drive (VFD) Cable:
   1. Provide VFD Cable for connection between all variable frequency drives and motors.
   2. Cable shall comply with ICEA Standard S-73-532, UL 1685 and IEEE 1202/383 Flame Test. TC-ER cables shall comply with UL 44 and UL1277; stranded copper conductors with ASTM B-3 and B-8.
   3. Cable shall be designed and manufactured specifically for application with variable frequency drives, shall be copper and include appropriate ground and symmetrical shielding conductors.

I. Nonmetallic-Sheathed Cable: Not permitted.

2.6 ELECTRICAL CONNECTIONS

A. Comply with NEC Article 110-14.
2.7 SPLICES AND TERMINATION COMPONENTS

A. UL 486A and UL 486B, as applicable for wire connectors, and UL 510 for insulating tapes. Connectors for wires No. 10 AWG and smaller shall be insulated pressure-type in accordance with UL 486A or UL 486C (twist-on splicing connector). Provide solderless terminal lugs on stranded conductors.

B. Splices and/or taps for #8 and larger conductors shall be crimp type by T&B, Burndy, Oz, or approved equal; or Ilsco KUP-L-Tap®, ClearTap, or approved equal.

2.8 DEVICE PLATES

A. Provide UL listed, one-piece device plates for outlets and fittings to suit the devices installed. Plates on unfinished walls and on fittings shall be of zinc-coated sheet steel or cast metal having round or beveled edges. Plates on finished walls shall be urea or phenolic, minimum 0.10 inch wall thickness, and shall be the same color as the receptacle or toggle switch with which it is mounted, or shall be satin finish stainless steel or brushed-finish aluminum, minimum of 0.03 inch thick as directed by Architect. Screws shall be machine type with countersunk heads in a color to match the finish of the plate. The use of sectional type device plated will not be permitted. Plates installed in wet locations shall be gasketed. Device plates for telephone outlets shall be as specified in Section 16740. All plates shall be oversize type.

2.9 SWITCHES

A. Toggle Switches: Fed. Spec. W-S-896, totally enclosed with bodies of thermosetting plastic and a mounting strap. Handles shall be white, gray, brown or ivory. Wiring terminals shall be of the screw type, side wired. Switches shall be rated quiet-type ac only, 120/277 volts, with the current rating and number of poles indicated. Colors shall be as directed by Architect.

B. Disconnect Switches: NEMA KS1. Provide heavy duty, fusible type. General duty and non-fusible switches are not permitted.

1. Operating mechanisms shall be of the quick-make, quick-break type, with arc-suppressing characteristics.
2. Enclosures shall be NEMA 1 indoors and NEMA 3R outdoors and in wet locations unless otherwise indicated, equipped with cover interlock and provisions for padlocking operating handle in OFF position. Safety switches shall be by the same manufacturer as panelboards.

2.10 RECEPTACLES

A. NEMA WD1, heavy-duty, grounding type. Ratings and configurations shall be as indicated. Bodies shall be of white, gray, brown or ivory thermosetting plastic supported on a metal
mounting strap. Wiring terminals shall be of the screw type, side wired. Connect grounding pole to the mounting strap. Colors shall be as directed by Owner.

B. Switched Duplex Receptacles: Provide separate terminals for each ungrounded pole. The bottom receptacle shall be switched when installed.

C. Weatherproof Receptacles: In all damp or wet locations, provide in a cast metal box with a gasketed, weatherproof, cast-metal cover plate and a gasketed cap over each receptacle opening. The cap(s) shall be provided with a spring-hinged flap. Cover shall be “in use” type where required by local codes. Receptacle shall be UL listed for use in “damp location” or “wet location” to suit installation location.

D. Tamper-Resistant Receptacles: All receptacles in areas required by NFPA 70 or as indicated shall be UL listed as tamper resistant. Tamper-resistant covers will not be accepted.

E. Ground Fault Circuit Interrupter Receptacles: UL 943, and shall be duplex type for mounting in a standard outlet box. The device shall be capable of detecting a current leak of 5 milliamperes.

F. Receptacles shall be by same manufacturer as toggle switches, as specified above.

G. Install grounding type receptacles with the grounding terminal at the top.

2.11 PANELBOARDS

A. UL 67 and UL 50. Panelboards for use as service disconnecting means shall additionally conform to UL 869. Panelboards shall be circuit breaker equipped unless indicated otherwise. Design shall be such that any individual breaker can be removed without disturbing adjacent units or without loosening or removing supplemental insulation supplied as a means of obtaining clearances as required by UL. Where “space only” is indicated, make provisions for the future installation of a breaker sized as indicated. All panelboard locks included in the project shall be keyed alike. Directories shall be typed to indicate load served by each circuit and mounted in a holder behind transparent protective covering. Directory listing for each breaker shall list the type load served (lighting, receptacles, etc.) and location of load (room name, room number, etc.)

B. Panelboard Buses: Support bus bars on bases independently of the circuit breakers. Main buses and back pans shall be designed so that breakers may be changed without machining, drilling, or tapping. Provide an isolated neutral bus in each panel for connection of circuit neutral conductors. Provide a separate ground bus marked with a green stripe along its front and bonded to the steel cabinet for connecting grounding conductors.

C. Circuit Breakers: Fed. Spec. W-C-375 thermal magnetic type with interrupting capacity as indicated or of 22,000 amperes symmetrical minimum. Breaker terminals shall be UL listed as suitable for the type of conductor provided. Plug-in circuit breakers shall be provided only where indicated in drawings.

1. Multi-pole Breakers: Provide common-trip type with a single operating handle. Breaker design shall be such that an overload in one pole automatically causes all poles to open. Maintain phase sequence throughout each panel so that any three adjacent breaker poles are connected to Phases A, B, and C, respectively.
2. Circuit Breaker with Ground-Fault Circuit Interrupter: UL 1053 and NFPA 70. Provide with “push-to-test” button, visible indication of tripped condition, and ability to detect a current imbalance of approximately 5 milliamperes.


4. Breakers Used as Switches for 120-Volt Fluorescent Fixtures: Breakers shall be marked “SWD” in accordance with UL 489.

5. Breakers used to serve refrigeration and air conditioning compressors shall be type “HACR.”

2.12 FUSES

A. Provide a complete set of fuses for each fusible device provided. Time-current characteristics curves of fuses serving motors or connected in series with circuit breakers or other circuit protective devices shall be coordinated for proper operation; submit coordination data for approval. Fuses shall have a voltage rating not less than the circuit voltage.

B. Cartridge Fuses, Current-Limiting Type (Class R): UL 198E, time-delay type. Associated fuseholders shall be Class R only.

C. Cartridge Fuses, Current-Limiting Type (Classes J and L): UL 198C, Class J for 0 to 600 amps and Class L for 601 to 6000 amps.

PART 3 - EXECUTION

3.1 RACEWAYS

A. Provide raceways for all conductors and cables. See drawings for raceway types approved for various locations and applications in the project.

B. Provide flexible metal conduit for connection to rotating or vibrating equipment. In all potentially wet locations, provide waterproof flexible conduit. In no case shall length of flexible conduit exceed 3 feet, except for transformers, where length shall not exceed 2 feet. Support in accordance with NEC and as approved by Engineer.

C. Contractor shall size pull and junction boxes. Comply with requirements for dimensions and conduit spacings as defined in the NEC Article 314.

D. Raceways shall be continuous between outlets and enclosures. Bond raceway system as described in drawings and grounding specifications, and make all connections wrench tight for electrical continuity. Connect raceways at boxes and enclosures using locknuts and bushings. Provide insulating bushings with grounding lug on all raceways one inch and larger.

E. Install raceways generally as follows:

1. Run concealed raceways in straight lines with long sweep bends and offsets.
2. Where raceways turn up out of floor, curved portion shall not be visible.
3. Run exposed raceways parallel and perpendicular with building lines. Strap with two-hole flat straps; do not use minerallac straps.

4. Support raceways within 3' of each outlet box, fitting, or enclosure, and at 10' intervals. Use malleable iron or stamped steel clamps for branch circuit raceways; use pipe hangers for feeder raceways. Do not hang conduit with wire, perforated strap, or nails.

5. Cut all joints square, thread, ream and draw tight. Make bends and offsets with standard conduit ells or with an approved bender or hickey.

6. No more than three quarter-bends equivalent in any run.

7. Cap raceway ends to prevent entrance of debris during construction. Cap with approved pennies, plastic caps or covers; do not tape.

8. Complete raceway installation and clean thoroughly before pulling conductors.

9. Where conduits pass through fire-rated walls and/or floors, provide a UL-listed through-penetration assembly with fire rating equal to wall or floor penetrated. Materials shall be by 3M Company or equal. Each assembly shall be specific to the penetrating device, e.g., single conduit, multiple conduits, busway, etc. and shall be specific to the wall or floor construction penetrated, e.g., concrete, gypsum board on wall studs, etc. Install assemblies in accordance with material manufacturer's instructions and UL Building Materials Directory, latest edition.

10. Install expansion fittings with copper bonding jumpers in conduit runs which cross building expansion joints.

11. Ferrous metal raceways, cable trays, cablebus, auxiliary gutters, cable armor, boxes, cable sheathing, cabinets, metal elbows, couplings, nipples, fittings, supports, and support hardware shall be suitably protected against corrosion inside and outside (except threads at joints) by a coating of approved corrosion-resistant material (Thomas & Betts, Kopr-Shield, or equal). Where corrosion protection is necessary and the conduit is threaded in the field, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.

F. Install pull boxes as shown in drawings and as required to pull conductors without damage to insulation. Provide pull boxes in accessible locations only, and size in accordance with NEC.

G. All feeder and branch circuit raceways shall be metallic and shall be provided with green ground conductor in accordance with NEC Article 517, redundant grounding requirements.

H. Install raceways of sizes shown in drawings and comply with Table 1 of NEC (latest edition). In case of conflict, install larger size.

I. Provide in each empty raceway a pull cord or wire, identified with a cardboard tag as to location of equipment or outlet fed by conduit.

3.2 OUTLET, SWITCH, AND JUNCTION BOXES, FITTINGS

A. Provide outlet and junction boxes as required for power, lighting, and communications systems as shown in drawings.

B. Boxes shall be held securely in place by being imbedded in masonry, or shall be secured to a fixed structural unit such as a stud or joist.
3.3 CONDUCTORS

A. Provide conductors in raceways as shown in drawings for service, feeders and branch circuits.

B. Conductors No. 8 and larger shall be connected to equipment by means of pressure type mechanical lugs. Where multiple conductors are connected to the same terminal each conductor shall be provided with an individual lug.

C. Soldered splices shall be made mechanically secure before soldering.

D. Wire and cable shall be suitably protected from weather during storage and handling and shall be in good condition when installed.

E. Join conductors with approved connectors, or by soldering, brazing or welding. Tape all connections or cover with approved prefabricated insulating devices to provide insulation resistance at the connection equal to that of the wire. Make splices in boxes or fittings only.

F. Do not pull conductors before completion of masonry, concrete and other trades which generate dust and debris. See raceways section, above.

G. Install and terminate variable frequency drive cable in accordance with manufacturer guidelines. Shield and ground conductors shall be securely bonded to motor case and drive enclosure to ensure control of ground current and electrical noise.

3.4 PANELBOARDS

A. Where shown on drawings and indicated in riser diagram, provide panelboards of the types and sizes indicated. Panelboards shall be installed with top of cabinet 72" above finished floor.

B. Comply with NFPA-70, Section 408, for installation requirements and with other applicable sections for clearances. Lay out all equipment rooms in advance of roughing and notify Engineer immediately, in writing, if interferences are encountered or if code requirements cannot be met with equipment proposed.

C. Provide multi-pole breakers of common-trip type to simultaneously disconnect all ungrounded conductors in multiwire branch circuits.

3.5 SAFETY SWITCHES

A. Provide heavy duty, fusible safety switches at locations shown on drawings, and in accordance with NEC requirements. Provide nameplates on switches as specified in Section 26 05 00. Wording shall identify the load which switch disconnects.

3.6 SWITCHES AND RECEPTACLES

A. Provide switches and receptacles for power and lighting as shown in drawings. Where indicated, verify location of receptacles with Owner prior to roughing.
B. Gang plates where two or more devices occur at the same location. Verify locations in relation to door swings, and place devices on the strike side.

C. Install devices at locations indicated in details.

D. Install outlets and devices plumb, level and with positioning at roughing to suit final wall covering. Device plates shall contact finished walls all-around on all four sides.

E. Protect devices during painting and clean-up of job. Leave devices clean and free from paint, dirt and debris.

F. Prior to final completion, check all receptacles for shorts, opens and grounds and correct all incorrect connections. Use receptacle checker as manufactured by Daniel Woodhead Company, General Electric, Leviton, or equal.

3.7 GROUNDING

A. Provide grounding system to comply with NEC, as shown on drawings and as specified.

B. Ground main service by bonding grounding conductor to steel building frame, concrete-encased electrode, main cold water pipe and three ground rods driven twelve feet apart outside building and located at least six feet away from building footings. Do not locate under paving; drive in planted areas only.

C. All ground rods and fittings used shall be free from paint, grease, and other poorly conducting material, and contact surfaces shall be cleaned thoroughly to ensure good metal-to-metal contact.

D. Install bonding jumpers between all panelboards and feeder raceways connected thereto; across pull box and raceway expansion joints and across water meters located within buildings.

E. All connections to grounding conductors shall be accessible for inspection and shall be made with solderless connectors brazed or bolted to the equipment or structure to be grounded. Unless otherwise indicated in drawings, grounding conductors within raceway system shall be installed in exposed rigid steel conduit with both conductor and conduit bonded at each end. Do not cover main service grounding until Engineer has observed connections.

F. Provide a ground wire in all circuits sized per NEC Table 250-122 as applicable.

G. Provide in all runs of flexible conduit a separate grounding conductor sized per NEC Table 250-122.

END OF SECTION 26 20 00