Indefinite Delivery of Mechanical Contracting Services

Project Number: H27-D157-NA

February 2012

February 6, 2012

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SE-310
REQUEST FOR ADVERTISEMENT

PROJECT NAME: Indefinite Delivery of Mechanical Contracting Services

PROJECT NUMBER: H27-D157-NA

PROJECT LOCATION: University of South Carolina

Contractor may be subject to performance appraisal at close of project

BID SECURITY REQUIRED? Yes ☒ **No** ☐

PERFORMANCE & PAYMENT BONDS REQUIRED? Yes ☒ **No** ☐

CONSTRUCTION COST RANGE: 100,000-250,000

DESCRIPTION OF PROJECT: Provide indefinite delivery of mechanical contracting services for all USC campuses statewide. The basis for this award will be determined by low bid for an actual project (USCA B&E Chiller Replacement). The contractor shall possess a Mechanical Contractor's License. A total of 8 Mechanical contractors will be selected. Small and minority business participation is encouraged.

A/E NAME: GMK Associates, Inc

A/E CONTACT: Tom Weiland

A/E ADDRESS: Street/PO Box: 1201 Main Street, Suite 2100
City: Columbia
State: SC ZIP: 29201-____

EMAIL: tweiland@gmka.com

TELEPHONE: 803.256.0000 **FAX:** 803.256.9610

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

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: purchasing.sc.edu

PLAN DEPOSIT AMOUNT: $0.00 **IS DEPOSIT REFUNDABLE: Yes** ☐ **No** ☐

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

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

purchasing.sc.edu

_____

_____

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

DATE: 3/7/2012 **TIME:** 11:30am **PLACE:** USC Aiken Campus, Business & Education Blding Rm 102

AGENCY: University of South Carolina

NAME OF AGENCY PROCUREMENT OFFICER: Michelle Adams, Procurement Manager

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

EMAIL: mdadams@fmc.sc.edu

TELEPHONE: 803-777-0981 **FAX:** 803-777-7334

BID CLOSING DATE: 3/19/2012 **TIME:** 11am **LOCATION:** USC Aiken Campus, Business & Education Blding Rm 102

BID DELIVERY ADDRESSES:

HAND-DELIVERY:

Attn: Lisa Groft
Supply & Maintenance Bldg
471 University Parkway
Aiken, South Carolina 29801

MAIL SERVICE:

Attn: Lisa Groft
Supply & Maintenance Bldg
471 University Parkway
Aiken, South Carolina 29801

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

APPROVED BY *(Office of State Engineer)***:** _____ **DATE:** _____

00200-IDC

INSTRUCTIONS TO BIDDERS
INDEFINITE DELIVERY CONTRACT – CONSTRUCTION

SECTION I - GENERAL

A. General Information:

1. It is the intention of **University of South Carolina** to solicit Indefinite Delivery Contract(s) for construction services generally described as new construction, renovation, restoration, and repair work for facilities owned or operated by the Owner. Construction services are to be performed at the following locations(s): **All of University of South Carolina campuses Statewide**

2. This solicitation is to be awarded and the contract administered by one of the following methods:

☑ **Low Bid IDC** This solicitation includes an actual project that the Owner will award, along with an Indefinite Delivery Contract, to the lowest responsive and responsible bidder. The lowest responsive and responsible bidder shall perform the construction of the actual project for its bid price. Multiple IDC contracts will be awarded under this solicitation.

Future construction services identified throughout the term of this Contract will be awarded through competitive bidding amongst contractors awarded a contract through this solicitation. A Construction Services Delivery Order will be issued to the lowest bidder for each future delivery order.

☐ **Cost Data Guide Multiplier IDC** This solicitation utilizes a bidder-provided multiplier to apply to a published cost data guide as the basis for initial contract award and future Construction Services Delivery Orders. Bidders are to bid a multiplier that will be applied to the unit prices contained in the cost data guide listed here. Award will be based on the lowest multiplier(s). Multiple contracts may be awarded under this solicitation. The multiplier times the unit prices in the listed cost data guide times the quantity of construction services to be performed will be the basis of award for future Construction Services Delivery Orders. The quantities of construction services to be performed will be agreed upon by the Owner and Contractor. Prices listed in the cost data guide are inclusive of costs to the contractor including overhead, mobilization, installation, labor and profit. If a contractor chooses to subcontract some or all of the construction services, the same contractual multiplier is to be applied to the unit prices contained in the cost data guide for pricing the subcontracted construction services. However, if the subcontracted construction services are outside the contractor's license authority, the contractor may include a markup of 13% on the price of the subcontracted construction services. No markup is allowed for subcontracted construction services within the contractor's license category (ies) required for this solicitation. No other additions to the cost of the construction services will be permitted except the cost of Performance and Payment Bonds, if required for specific Construction Services Delivery Orders. The cost data guide and edition to be used for this solicitation is: The latest edition of this guide **[may][may not]** be used for future Construction Services Delivery Orders.

The Owner will identify future construction services to be done throughout the term of this Contract and will meet with the ID Contractor to develop a Delivery Order Scope and agree on which Cost Data Guide unit prices and quantities are to be used to price the construction services. Once the contractor agrees in writing on the Cost Data Guide unit prices and quantities applicable to the Delivery Order Scope, the Owner will award the Construction Services Delivery Order. If more than 20% of the construction services are not covered by the Cost Data Guide unit prices and the construction services are within the scope of this solicitation, competitive quotes will be solicited from all ID contractors. Pricing from each ID contractor shall not exceed the applicable Cost Data Guide unit prices for that portion of construction services covered by the contractual Cost Data Guide and a separate portion (lump-sum bid amount) of the quote for construction services not covered by the Cost Data Guide.

INSTRUCTIONS TO BIDDERS
INDEFINITE DELIVERY CONTRACT – CONSTRUCTION

☐ **Unit Price IDC** This solicitation utilizes Unit Prices, included in this bid package to be used for **[initial award of an actual project and] [future]** Delivery Orders. The contractual Unit Prices multiplied by the quantity of construction services to be performed will be the basis of award for Construction Services Delivery Orders. The Unit Prices are to be inclusive of costs to the Contractor including overhead, mobilization, installation labor and profit. The Contractor may not add any other markup to the contractual Unit Prices. If a Contractor chooses to subcontract some or all of the construction services, the same contractual Unit Prices shall be used for pricing. However, if the subcontracted construction services are outside the Contractor's license authority, as required by this solicitation, the Contractor may include a markup of 13% on the price of subcontracted construction services. No markup is allowed for construction services within the Contractor's license category (ies) required by this solicitation. No other additions to the cost of the construction services will be permitted except the cost of Performance and Payment Bonds, if required for specific Construction Services Delivery Orders.

The Owner will identify future construction services to be done throughout the term of this Contract and will meet with the ID Contractor to develop a Delivery Order Scope and agree on which Unit Prices and quantities are to be used to price the construction services. Once the contractor agrees in writing on the Unit Prices and quantities applicable to the scope of work, the Owner will award the Construction Services Delivery Order. If more than 20% of the construction services are not covered by the Unit Prices and the construction services are within the scope of this solicitation, competitive quotes will be solicited from all ID contractors. Pricing from each ID Contractor shall not exceed the applicable Unit Prices for that portion of construction services covered by the contractual Unit Prices and a separate portion (lump-sum bid amount) of the quote for construction services not covered by the Unit Prices

3. The Owner intends to award a contract to the lowest responsive and responsible bidder. The Owner may award a total of **_8__** Indefinite Delivery Contracts to other bidders responding to this solicitation, starting with the second lowest responsible and responsive bidder and so forth, in the manner set forth in these instructions.
4. The Owner **does not** guarantee a minimum amount of work, **and** does not guarantee the size or quantity of any Construction Services Delivery Orders awarded pursuant to this solicitation.
5. The minimum amount of work guaranteed for this contract shall be: **$0.00**. The Owner estimates that **$1,000,000** of work will be awarded under **this** contract. This estimate is not a representation to an offeror or contractor that the estimated quantity will be required or ordered, or that conditions affecting requirements will be stable or normal. Failure to bid or quote future work, if awarded a Contract, will result in the forfeiture of this guarantee and possible termination of the Contract.
6. This solicitation does not commit the Owner to award a Contract nor to pay for any cost incurred by the bidder in the preparation of a bid.
7. All Indefinite Delivery Contracts issued under this solicitation will be for a period of time not to exceed two years from the date of Contract execution unless otherwise stated here:
8. Each Indefinite Delivery Contract shall allow the Owner to award a Contractor a total amount of work via Construction Services Delivery Orders not exceeding **$1,000,000**. No single Construction Services Delivery Order or project may exceed **$250,000.**
9. The form of the Contract shall be: University of South Carolina Contract for the Indefinite Delivery of Construction Services
10. Other information concerning this solicitation: **NA**

B. Architect/Engineer:

1. The Architect or Engineer of Record (A/E) will be identified on each Construction Services Delivery Order.
2. In the absence of an A/E the Owner will act in that capacity.

C. Contractor's Licensing:

1. Contractors are required by the South Carolina Code of Laws to be properly licensed in the license category and the group classification to permit an award of Construction Services Delivery Orders

of **$250,000** per single project at the time of bidding.

2. The contractor license category (ies) required for this work **is: Group 5 or greater Mechanical Contracting license**
3. **This** license(s) must be maintained for the term of the Contract.

D. Subcontractors:

1. Some incidental work may be necessary under a Construction Services Delivery Order that will require performance not authorized by the license category required by this solicitation. A properly licensed subcontractor shall be utilized, and the terms and conditions of the Contract must be passed to the sub-contractor to protect the rights of the Owner.
2. Subcontractors shall be properly licensed as required by the South Carolina Code of Laws.
3. The Owner reserves the right to review the Contractor's proposed subcontractors and to request substitution of those to which the Owner has reasonable objection.

E. Definitions:

1. The term "Indefinite Delivery Contract" (IDC) means a contract that does not procure or specify a defined quantity of services (other than a minimum or maximum quantity) and that provides for the issuance of delivery orders for the performance of tasks during the period of the contract.
2. A Construction IDC is a contract whereby the contractor agrees to provide the Owner construction services on an "as-needed" basis during the term of the Contract.
3. A Construction Services Delivery Order is an order issued by an Owner for a Contractor to perform work (tasks) under an IDC.
4. Any reference to "Manual" means the *Manual for Planning and Execution of State Permanent Improvements-Part II* as issued by the Office of State Engineer (OSE).
5. 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 for IDC (00200-IDC), the Bid Form **SE-330**, the Intent to Award Notice (SE-370), and other sample bidding and contract forms. The proposed Contract Documents consist of the Form of the Contract for Indefinite Delivery Services Between the Owner and Contractor, Terms and 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.

SECTION II – PRE-BID CONFERENCES AND SITE VISITS

A. The Owner may hold a pre-bid conference or site visit as a prerequisite for bidding as specified in the Advertisement.

B. The Owner has the right to schedule more than one pre-bid conference or site visit if deemed to be in the best interest of the State.

C. 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.

D. 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.

INSTRUCTIONS TO BIDDERS
INDEFINITE DELIVERY CONTRACT – CONSTRUCTION

SECTION III - OBTAINING BIDDING DOCUMENTS

A. Bidders may obtain complete sets of the Bidding Documents from the issuing office specified in the Advertisement in the number and for the deposit sum, if any, stated therein. If so provided in the Advertisement, the deposit will be refunded to all plan holders who return the Bidding Documents in good condition within ten (10) days after receipt of bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A bidder receiving a Contract award may retain the Bidding Documents and the bidder's deposit will be refunded.

B. Bidders shall use complete sets of documents as obtained from the source specified in the Advertisement. No partial sets will be issued.

C. All persons obtaining Bidding Documents from the issuing office specified 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.

SECTION IV - EXAMINATION OF BIDDING DOCUMENTS

A. 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.

B. Should the bidder notice any errors, conflicts or other inconsistencies with the bidding documents, the bidder shall notify the A/E in writing.

C. Corrections, interpretations and changes, which modify the bid documents, will be made by official addendum only. Any other form of communication, oral or written, is unofficial and non-binding on the Owner.

D. 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.

E. 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 A/E at least ten (10) days prior to the date for receipt of bids established in the Advertisement. 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 solicitation, 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 A/E's decision of approval or disapproval of a proposed substitution shall be final.

SECTION V - ADDENDA

A. If the A/E amends the Contract Documents prior to bidding, an addendum will be issued. All addenda will be sent to all prospective bidders who have obtained bid documents as specified in the Advertisement. No addendum will be issued later than 120 hours prior to 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.

B. 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 or amended Bid Date.

C. 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 Advertisement, the time specified for receipt of bids will be deemed to be extended to the same time of day specified in the Advertisement, or amended by addendum, on the first work day on which normal government processes resume. In lieu of an automatic extension, an addendum may be issued to reschedule bid opening. If state offices are closed at the time a pre-bid or pre-proposal conference is scheduled, an addendum will be issued to reschedule the conference. Useful information may be available at: http://www.scemd.org/scgovweb/weather_alert.html

D. Bidders are responsible to ascertain that they have received copies of all addenda issued prior to bidding. Bids received that do not acknowledge receipt of all addenda shall be rejected as non-responsive except for the following reasons:

1. The addendum only gives clarifications; or,
2. The bid received clearly indicates that the bidder received the addendum; or,
3. The addendum clearly would have had no effect or merely a trivial or negligible effect on price, quality, quantity, or delivery as defined in The Consolidated Procurement Code, Regulations, and Manual, and does not affect the relative standing of the Bidders. Under no circumstances can the bid amount be changed or modified.

E. 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.

F. Addenda will be sent, and other official communications will be conducted, via e-mail unless otherwise stated in the Advertisement.

SECTION VI - PREPARATION AND DELIVERY OF BIDS

A. 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.

B. Sums and multipliers shall be expressed in figures.

C. Bidder shall not make stipulations or qualify the 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.

D. 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.

E. Bids and Bid Security, and any other documents required to be submitted with the bid should be enclosed in a sealed, opaque envelope. The envelope should be addressed to the party receiving the bids and shall be identified with the project name, number, and the bidder's name and address.

F. The Bidder shall assume full responsibility for timely delivery of the bid at the appropriate location designated for the receipt of bids as specified in the Advertisement.

1. Bidders attending the bid opening should bring their bids to the place of the bid opening and deliver the bid to the Procurement Officer of the Owner or his designee prior to the time of the bid opening.
2. Bids sent by mail or special delivery service (USPS, UPS, Federal Express, etc.) should be labeled "SEALED BID ENCLOSED", and shall be addressed to the Owner's designated purchasing office as specified in the advertisement. Delivery of bids to the specified location shall be prior to the time of bid opening. Bids not received at the above location or the advertised mail room prior to the time of bid opening will be subject to rejection.
3. Bidders hand delivering their bids shall deliver bids to the place of the Bid Opening as shown in the Advertisement. 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 Advertisement prior to the time of the Bid Opening.

G. Bidders should include all special documents requested to be submitted with the bid. If these documents are not included with the bid, the bidder shall have 24 hours after the time set for the bid opening to submit these documents or the bid may be considered non-responsive.

H. 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.

SECTION VII - BIDDER'S REPRESENTATIONS

By submitting a bid for this solicitation, the bidder certifies that:

A. **Disclosure of Conflicts of Interest or Unfair Competitive Advantage**: You warrant and represent that your bid identifies and explains any unfair competitive advantage you may have in competing for the proposed contract and any actual or potential conflicts of interest that may arise from your participation in this competition or your receipt of an award. Without limitation, an unfair competitive advantage exists where a contractor competing for award possesses either proprietary information that was obtained from a government official without proper authorization or source selection information (as defined in Regulation 19-445.2010(C) that is relevant to the contract but is not available to all competitors, and such information would assist that contractor in obtaining the contract. If you have an unfair competitive advantage or a conflict of interest, the state may withhold award. Before withholding award on these grounds, a bidder will be notified of the concerns and provided a reasonable opportunity to respond. Efforts to avoid or mitigate such concerns, including restrictions on future activities, may be considered.

B. 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—

(i) Those prices;

(ii) The intention to submit a bid; or

(iii) The methods or factors used to calculate the prices offered.

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

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit 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)(i) Has been authorized, in writing, to act as agent for the bidder's principals in certifying that those principals have not participated, and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this certification (As used in this subdivision (b)(2)(i), the term "principals" means the person(s) in the bidder's organization responsible for determining the prices offered in this bid);

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

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

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

C. CERTIFICATION REGARDING DEBARMENT AND OTHER RESPONSIBILITY MATTERS:

(a)(1) By submitting a bid, bidder certifies, to the best of its knowledge and belief, that-

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

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

(B) Have not, within a three-year period preceding this bid, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of bids; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

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

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

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

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

(c) If bidder is unable to certify the representations stated in paragraphs (a)(1), 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 non-responsible.

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

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

D. 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.

E. 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.

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

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

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

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

G. 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 bidder'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".

H. 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.

I. TAX CREDIT FOR SUBCONTRACTING WITH MINORITY FIRMS: Pursuant to § 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.

J. 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.

SECTION VIII - WITHDRAWAL OR REVISION OF BIDS PRIOR TO BID OPENING

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.

SECTION IX - OPENING OF BIDS

A. 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.

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

C. The Owner will send a copy of the final bid tabulation to all bidders within ten (10) working days of the bid opening.

D. If Owner determines to award contract(s), Owner will, after posting a Notice of Intended Award, send a copy of the notice to all bidders.

E. If only one bid is received, Owner will open and consider the bid.

SECTION X - IRREGULAR BIDS

A. The Owner shall have the right to reject any or all bids, reject a bid not accompanied by a required bid security or other data required by the bidding documents, or reject a bid that is in any way incomplete or irregular.

B. 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. Showing any material modification(s) or exception(s) qualifying the bid;
6. Faxing a bid directly to the Owner or their representative; or
7. Failure to include a properly executed Power-of-Attorney with the Bid Bond.

C. 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.

SECTION XI - CONSIDERATION OF BIDS

A. Failure by a bidder to correct any deficiency as requested may cause the bid to be rejected as non-responsive.

B. The Owner shall not award a contract before the eleventh day after the Notice of Intended Award is posted. If only one bid is received and determined to be responsive and responsible, award may be made after posting the Notice of Intended Award without the ten-day waiting period.

C. Contractor's Qualifications - A prospective Contractor shall be considered as meeting the state standards of responsibility when the firm has:

1. Appropriate financial, material, equipment, facility and personnel resources and expertise, or the ability to obtain them, necessary to indicate his ability to meet all contractual requirements;
2. A satisfactory record of performance;
3. **S**atisfactory record of integrity;
4. Qualified legally to contract with the State;
5. Supplied all necessary information in connection with the inquiry concerning responsibility;

D. 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

E. Pursuant to §11-35-1520(8), the Procurement Officer may elect to communicate with a bidder, after bid opening, for the purpose of clarifying either the bid or the requirements of the Invitation for Bids. Such communications may be conducted only with bidders who have submitted a bid which obviously conforms in all material aspects to the Invitation for Bids and only in accordance with Appendix D (Paragraph A(6)) to the *Manual for Planning and Execution of State Permanent Improvements, 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. [§ 11-35-1520(8); R.19-445.2080]

SECTION XII - AWARD OF CONTRACT

A. At the conclusion of the ten day waiting period on the eleventh day after the Notice of Intended Award is issued, the Owner will issue to the successful bidder(s) a Contract.

B. The successful bidder(s) shall obtain, and forward to the Owner, a copy of the certificate of insurance as required by the Contract and the copies of the Contract signed by the bidder.

C. After the Contract is fully executed work may be awarded to the successful bidder in the manner described in the Contract.

SECTION XIII - BONDS

A. 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.

B. 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.

C. 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.

D. he 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.

E. The Performance and Payment Bonds shall conform to the requirements of the Contract. If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid or be added to the cost of the Construction Services Delivery Order. Performance Bonds and Labor & Material Payment Bonds in the amount of 100% of the Construction Services Delivery Order amount are required for all Construction Services Delivery Orders exceeding $50,000. The Owner may require bonds on Construction Services Delivery Orders under $50,000.

SECTION XIV - OTHER INFORMATION

A. POSTING OF INTENT TO AWARD

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

Room or Area of Posting: Lobby

Building Where Posted: Facilities and Admin Building

Address of Building: 743 Greene Street

WEB site address (if applicable):

Posting date will be announced at the 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.

B. 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 CPOC, Office of State Engineer, and submitted in writing:

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

(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.

C. Special documents required to be submitted with the Bid for this project include:

1. ***NONE***

END OF DOCUMENT

BID FORM
SE-330

2011 Edition

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

BID SUBMITTED BY: _____

(Bidder's Name)

BID SUBMITTED TO: University of South Carolina

(Owner's Name)

FOR PROJECT: H27-D157-NA Indefinite Delivery of Mechanical Contracting Services

(Number) *(Name)*

OFFER

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

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

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

(Bidder check one)

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

ADDENDUM No: _____

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

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

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

Provide labor and materials for the demolition of existing equipment installation of an owner supplied chiller and pumps package.

_____, which sum is hereafter called the Base Bid.

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

ALTERNATE #1 (*Brief Description*): Chiller rental line item as indicated by note on drawing M2.0

☐ **ADD TO** or ☐ **DEDUCT FROM BASE BID:** _____

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

ALTERNATE #2 (*Brief Description*): _____

☐ **ADD TO** or ☐ **DEDUCT FROM BASE BID:** _____

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

ALTERNATE #3 (*Brief Description*): _____

☐ **ADD TO** or ☐ **DEDUCT FROM BASE BID:** _____

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

§ 7. LISTING OF PROPOSED SUBCONTRACTORS PURSUANT TO SECTION 3020(b)(i), CHAPTER 35, TITLE 11 OF THE SOUTH CAROLINA CODE OF LAWS, AS AMENDED – ***(See Instructions on the following page BF-3A)***

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

SUBCONTRACTOR SPECIALTY **By License Classification and/or Subclassification** (Completed by Owner)	**SUBCONTRACTOR(S) OR PRIME CONTRACTOR'S NAME** ((Must be completed by Bidder)	**SUBCONTRACTOR'S SC LICENSE NUMBER**
	BASE BID	
None Required		
	ALTERNATE # 1	
	ALTERNATE # 2	
	ALTERNATE # 3	

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

INSTRUCTIONS FOR SUBCONTRACTOR LISTING

1. Section 7 of the Bid Form sets forth a list of subcontractor specialties for which bidder is required to identify by name the subcontractor(s)Bidder will use to perform the work of each listed specialty. Bidder must identify only the subcontractor(s) who will perform the work and no others.

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

3. Bidder must only insert the names of subcontractors who are qualified to perform the work of the listed specialties as specified in the Bidding Documents and South Carolina Licensing Laws.

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

5. If Bidder intends to use multiple subcontractors to perform the work of a single specialty listing, Bidder must insert the name of each subcontractor Bidder will use, preferably separating the name of each by the word **"and"**. If Bidder intends to use both his own employees to perform a part of the work of a single specialty listing and to use one or more subcontractors to perform the remaining work for that specialty listing, bidder must insert his own name and the name of each subcontractor, preferably separating the name of each with the word **"and"**.

6. Bidder may not list subcontractors in the alternative nor in a form that may be reasonably construed at the time of bid opening as a listing in the alternative. A listing that requires subsequent explanation to determine whether or not it is a listing in the alternative is non-responsive. If bidder intends to use multiple entities to perform the work for a single specialty listing, bidder must clearly set forth on the bid form such intent. Bidder may accomplish this by simply inserting the word "**and**" between the name of each entity listed for that specialty. Owner will reject as non-responsive a listing that contains the names of multiple subcontractors separated by a blank space, the word "or", a virgule (that is a /), or any separator that the Owner may reasonably interpret as a listing in the alternative.

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

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

9. Bidder's failure to insert a name for each listed specialty subcontractor will render the Bid non-responsive.

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

§ 9. TIME OF CONTRACT PERFORMANCE AND LIQUIDATED DAMAGES

a. CONTRACT TIME: Bidder agrees that the Date of Commencement of the Work shall be established in a Notice to Proceed to be issued by the Owner and Bidder shall substantially complete the Work within 60 calendar days from the Date of Commencement, subject to adjustments as provided in the Contract Documents.

b. LIQUIDATED DAMAGES: Bidder further agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the sum of $ 100.00 for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted time for Substantial Completion as provided in the Contract Documents. This sum is intended by the parties as the predetermined measure of compensation for actual damages, not as a penalty for nonperformance.

§ 10. AGREEMENTS

a. Bidder agrees that this bid is subject to the requirements of the law of the State of South Carolina.

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

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

§ 11. ELECTRONIC BID BOND

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

(Electronic Bid Bond Number)	***(Signature and Title)***

BIDDER'S TAXPAYER IDENTIFICATION

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER:_____

OR

SOCIAL SECURITY NUMBER:_____

CONTRACTOR'S CLASSIFICATIONS AND SUBCLASSIFICATIONS WITH LIMITATIONS

Classification(s) & Limits:_____

Subclassification(s) & Limits:_____

SC Contractor's License Number(s):_____

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

SIGNATURE

_____

(Legal Name of Person, Firm or Corporation Submitting Bid)

_____

(Mailing Address for the above)

BY:_____ **DATE:**_____

(Signature)

TITLE:_____ **TELEPHONE:**_____

A310

BID BOND

(Replacement Page)

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

Original AIA Document on file at the office

of Facilities Business and Finance

743 Greene Street, Columbia, SC

University of South Carolina Contract for the Indefinite Delivery of Construction Services

THIS CONTRACT, made this ____ day of _____ _20___, by and between

OWNER
Board of Trustees c/o
University of South Carolina
743 Greene Street
Columbia, South Carolina 29208

CONTRACTOR
_____
_____
_____
_____

WHERAS, the Owner requires the delivery of Mechanical Construction Services*(Type of Construction Services for this Contract)* construction services on an as-needed basis, hereinafter referred to as the "Construction Services", for the following Project identified as follows:

H27-D157-NA and _____ and
(State Project Number) *(Owner's Contract Number)*

Indefinite Delivery of Mechanical Construction Services; and
(Project Name)

WHEREAS, the CONTRACTOR, whose FEIN/SSN is _____ and whose South Carolina Contractor's license is _____ is prepared and qualified to provide such services.

NOW THEREFORE, the Owner and Contractor agree to all of the following terms and conditions set forth in this Contract.

THE EFFECTIVE DATE of this Contract shall commence as of the date written above and the term shall be for a period not to exceed two years and will end as of ____ _____. The term of this Contract may not be extended by amendment.

THE SERVICES REQUESTED by the Owner shall be set forth in a Request for Quotes Form for specific construction services. The Contractor agrees to accept all such requests for services issued by the Owner, unless the work requested is not within the expertise or license limitations of the Contractor; or as agreed by the Owner for just cause in the mutual interests of the Owner and Contractor.

THE SERVICES PROVIDED by the Contractor shall be set forth in the Owner's Construction Services Delivery Order which, once the Contractor's proposal is approved by the Owner, shall be incorporated into this Contract, and all work shall be performed by the Contractor in accordance with the Terms and Conditions of this Contract.

PAYMENTS TO THE CONTRACTOR for acceptable work performed shall be as follows:

THE MAXIMUM AMOUNT to be paid for all work under the terms of this agreement is: **$1,000,000**

THE MAXIMUM DELIVERY ORDER AMOUNT to be paid for construction services is: **$250,000**

THE CONTRACTOR'S COST PROPOSALS shall be based on the following method: *(choose one)*

☒ **LOW BID**	☐ **UNIT PRICES**	☐ **MULTIPLIER** of _____ using:
Initial Contract Amount: $_____	**Based on the attached Bid Form**	**[***Enter Name and Edition of the applicable cost data guide***]**

IN WITNESS WHEREOF, THE PARTIES HERETO HAVE ENTERED INTO THIS CONTRACT ON THE DAY AND YEAR FIRST WRITTEN ABOVE.

OWNER

BY: _____
(Signature of Owner's Representative)

Amy Stone
(Print or Type Name** of **Owner's Representative)

ITS: Secretary of Board of Trustee's
(**Title **of Owner's Representative)

CONTRACTOR

BY: _____
(Signature of Contractor's Representative)

_____
(Print or Type Name of Contractor's Representative)

ITS: _____
(Title of Contractor's Representative)

Terms and Conditions of the *University of South Carolina* Contract for Indefinite Delivery of Construction Services

ARTICLE 1 - GENERAL

A. The Contractor agrees to provide construction services to the Owner as required by the Owner and as set forth in a Construction Services Delivery Order that the Owner may issue from time to time during the term of this Contract.

B. Work by the Contractor shall be performed only in response to a duly authorized Construction Services Delivery Order issued by the Owner.

C. The maximum amount of each Construction Services Delivery Order, including modifications shall not exceed **$250,000** per project nor shall the total amount of all Construction Services Delivery Orders, including modifications, exceed **$1,000,000** during the term of this Contract.

D. The duration of this Contract shall not be extended by amendment nor renewed for an additional period. Construction Services Delivery Orders authorized by the Owner within the term of the Contract may be completed by the Contractor even though the completion date may extend beyond the term of the Contract.

E. This Contract will guarantee a minimum of work of **[$0.00]** per Contract. Failure to bid or quote on Construction Services Delivery Orders as requested by the Owner will result in forfeiture of this guarantee.

F. The Contractor covenants with the Owner to furnish its best skill and judgment and to cooperate with the Owner and any other contractors in furthering the interests of the Owner.

G. The construction services provided pursuant to this Contract shall be performed in accordance with the applicable requirements of the *Manual for Planning and Execution of State Permanent Improvements-Part II*.

H. The Contract Documents forming this agreement shall consist of the following: (1) **[University of South Carolina** Contract for the Delivery of Indefinite Delivery of Construction Services and the Terms and Conditions of the **University of South Carolina** Contract for Indefinite Delivery of Construction Services (this document) and any listed attachments and supplementary conditions thereto; (2) the Bidding Documents and all Addenda thereto; (3) the Contractor's completed Bid Form **[SE-330**; (4) the Contractor's individual delivery order scope proposals submitted pursuant to an authorized Construction Services Delivery Order; (5) any Construction Services Delivery Orders, Form SE-680, issued under this Contract; (6) all Construction Services Delivery Order Modifications, Form SE-690; and (7) the 00200-IDC.

ARTICLE 2 – AUTHORIZATION OF SERVICES

A. The Contactor shall not incur any expense chargeable to the Owner on or about the work of any Construction Services Delivery Order assigned to this Contract until award of the Construction Services Delivery Order has been duly authorized and fully executed by both the Owner and the Contractor.

B. The Owner will initiate a Delivery Order Scope of work for construction services and will provide adequate project information as required.

C. The Contractor shall prepare a proposal to complete the work as requested. The proposal will be submitted to the Owner within one (1) week of the request or as otherwise requested by the Owner in the specific request.

D. The Contractor shall include in each proposal a schedule showing the anticipated dates for completion of various milestones of the work.

E. The proposal shall include the cost of the construction services prepared according to the method described in the Contract. The cost portion of the proposal shall be by one of the following methods determined by the solicitation and noted on the contract (page 1 of this document):
   a. Low Bid – The Contractor shall provide a bid on the Construction Services Delivery Order Scope to be completed for each project.
   b. Cost Data Guide Multiplier - The Contractor shall use their bid multiplier times the unit prices contained in the cost data guide as listed on Page 1 of this Contract times the number of units for the work in the proposed Delivery Order Scope of work.
   c. Unit Prices - The Contractor shall use the unit prices contained in their Bid of the Contract, times the number of units for the work in the proposed Delivery Order Scope of work.
   d. Note: Should unit prices or cost data guide line items not be available for items of work to be included in the Construction Services Delivery Order Scope, the Contractor shall prepare a proposal including labor and material cost breakdown with overhead and profit added as follows for that portion of the work not covered by either the unit prices or cost data guide:
      1. For the Contractor or subcontractor on work performed by their own forces, 13% of the actual costs.

2. For the Contractor on work performed by its subcontractors, 10% of the subcontractor's actual costs (not including the subcontractor's overhead and profit).

e. Nothing in this Contract prohibits a Contractor from submitting a price lower than that which would be established using their initial cost data guide multiplier or unit prices.

F. The Owner, upon receipt will review the Contractor's proposal in a timely manner and accept or reject it. Except for delivery orders based on competitive bidding, prior to approving a Construction Services Delivery Order, the Owner reserves the right to negotiate with the Contractor to revise the scope of the proposed construction services and costs that are believed to be in the best interest of the State. For delivery orders based on competitive bidding, the Owner must allow all bidders the opportunity to revise their proposals for significant changes in the scope of work.

G. Upon acceptance of a proposal the Owner will issue a Construction Services Delivery Order toward this Contract.

H. If the Contractor fails to provide a cost proposal within the required time limit, or otherwise provides a response that the Owner deems, in its sole discretion, to be unacceptable, the Owner may withdraw the request and use an alternative contractor or alternative method of procurement to provide the construction services.

I. The Owner's approval of a Construction Services De1ivery Order shall be the Contractor's Notice to Proceed with the work. The time limits stated in the Construction Services Delivery Order are of the essence. By executing the Construction Services Delivery Order, the Contractor confirms that the performance dates in the Construction Services Delivery Order constitutes a reasonable period for performing the work.

ARTICLE 3 - CONTRACTOR'S RESPONSBILITIES

A. The Contractor shall designate one or more representatives to be assigned for the duration of the project. These representatives shall be authorized to act on behalf of the Contractor in all matters related to the Contractor's performance under this Contract. The Contractor shall not replace a designated representative except for good cause shown and with approval of the Owner.

B. The Contractor warrants to the Owner that:
   1. It and its subcontractor(s) (if any) are financially able to complete the work.
   2. It will perform all obligations, furnish all material, equipment, tools, transportation, supplies and labor to complete the work assigned.
   3. It is authorized and properly licensed to do business in the State of South Carolina and the local jurisdiction in the area of the work site.
   4. It is duly authorized to execute the Contract and accept Construction Services Delivery Orders.
   5. It possesses a high level of experience and expertise in the business administration, construction, management, and supervision of projects that may be assigned to this Contract, and will perform the work with care and diligence in a professional and workmanlike manner.

C. The Contractor shall have, at the time of execution of this Contract, all professional and business insurance, licenses and permits legally required to provide the required construction services in the State of South Carolina and as required by this Contract.

D. The Contractor shall perform construction services as required by any Construction Services Delivery Order signed by both parties.
   1. The Contractor shall pay for required business license fees, labor, materials, equipment, tools, transportation, supervision, testing, etc., as required for the performance of the work or as specified in approved Construction Services Delivery Order.
   2. The Contractor shall visit the site and take measurements, observations, tests or otherwise obtain information to assist in familiarization with the work site, its conditions and limitations that would affect the performance of the work.
   3. The Contractor shall review the documents furnished with the Owner's Construction Services Delivery Order to become familiar with the requirements of the project and understand the scope of work required. The Contractor shall have the right to rely on information contained in the proposal documents. Such reliance requires that the Contractor shall review all information provided by the Owner, including that available by visiting the site, exercising care, skill and diligence of a contractor experienced in the work required, and shall give prompt and timely notice to the Owner of any apparent deficiencies or inconsistencies in the information furnished by the Owner or the A/E.

4. In the event of inconsistencies within or between parts of the Construction Services Delivery Order or between the Construction Services Delivery Order and applicable standards, codes, and ordinances, 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 A/E's interpretation.

E. The Contractor does not have the responsibility to determine that the design of the project is in conformance with applicable building codes and regulations, but if during the review of the Construction Services Delivery Order, it is found that any apparent violations exist, it is the Contractor's responsibility to inform the A/E and the Owner of such apparent violation.

F. The Contractor is responsible for construction means, methods, techniques, procedures and safety measures in the performance of the work.

G. The Owner shall obtain, at its own cost, general building and specialty inspection services and material testing as required by the Contract Documents. The Contractor shall coordinate and call for inspections or material testing as needed during the construction process. The Contractor shall be responsible for payment of any charges imposed for re-inspections or re-testing due to failed inspections or tests.

H. The Contractor shall employ only persons skilled in the work for which they are to do, employ an experienced superintendent to supervise the work, and shall be responsible for the acts or omissions of the Contractor's agents and employees or those of subcontractors and their agents and employees acting on behalf of the Contractor.

I. The Contractor shall cooperate with and coordinate its work with the work of others.

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

ARTICLE 4 -OWNER'S RESPONSIBILITIES

A. 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. The Architect does not have such authority. The term "Owner" means the Owner or the Owner's Representative.

B. The Owner does not warrant the accuracy of any 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 characteristics or other conditions of the area where the work is to be performed beyond that which is provided for in the Contract Documents.

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

D. The Owner shall designate one or more representatives with authority to act and make binding decisions on the Owner's behalf in all matters related to the Owner's duties under this Contract.

E. The Owner shall secure and pay for all design permits, assessments, and easements except as required by any Construction Services Delivery Order issued under the terms of the Contract.

F. The Owner shall obtain, at its own cost, general building, specialty inspection services and material testing as required by the Contract Documents.

G. The Owner shall make timely decisions on all issues related to the Construction Services Delivery Order and shall promptly advise the Contractor of any errors or deficiencies in the Contractor's performance under this Contract.

H. The Owner shall pay the Contractor for acceptable work performed, in accordance with the provisions of this Contract.

ARTICLE 5 – A/E'S RESPONSIBILITIES

A. The term "Architect," "Architect/Engineer," or "A/E" is the entity named as such in the Delivery Order Scope. The Architect or A/E may be the Owner, if so designated. In the absence of a licensed design professiona1, these terms mean the Owner.

B. The A/E and the A/E'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 A/E's or A/E's consultants' reserved rights.

C. The A/E shall represent the Owner during the construction process through final completion of the project, and as requested during the warranty period. The A/E will act on behalf of the Owner only to the extent provided in the Construction Services Delivery Order or otherwise agreed by the Owner.

D. The A/E, as a representative of the Owner, shall visit the site as necessary to fulfill its obligations to the Owner for inspection services, if any, and, at a minimum, to assure conformance with the A/E's design as shown in the Construction Services Delivery Order and to observe the progress and quality of the various components of the Contractors work. The A/E shall (1) keep the Owner informed about the progress and quality of the work completed, (2) endeavor to guard the Owner against defects and deficiencies in the work, and (3) determine if the work is being performed in a manner indicating that the work, when fully completed, will be in accordance with the Construction Services Delivery Order.

E. The A/E will make recommendations to the Owner as to acceptance or rejection of the work and communicate the Owner's decision to the Contractor.

F. The A/E will review and approve or reject shop drawings and samples submitted by the Contractor.

G. The A/E shall respond promptly to all requests for information or clarification from the Owner or the Contractor.

H. The A/E will make the initial interpretation and decision on matters concerning performance under, and requirements of, a Construction Services Delivery Order on written request of either the Owner or Contractor. Upon receipt of such request, the A/E shall promptly notify the non-requesting party in writing of the details of such request. The A/E's response to such requests will be made writing within any time limits agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of the A/E shall be furnished, then delay shall not be recognized on account of failure by the A/E to furnish such interpretations until fourteen (14) days after written request is made for them. The interpretation or decision of the A/E shall be final, subject to the dispute resolution provisions of this Contract.

I. The A/E will not be responsible for construction means, methods, techniques, procedures and safety measures in the performance of the work nor acts or omissions of the Contractor, Subcontractors or any other entity performing work on the site.

J. The A/E will review periodic requests for payment, and approve or reject the request, in whole or in part.

K. The A/E will prepare Construction Services Delivery Order Modifications or change directives as directed by the Owner.

L. Any reference in the Contract Documents to the A/E taking action or rendering a decision within a "reasonable time" or "timely manner" is understood to mean no more than fourteen (14) days, unless otherwise specified in the Contract Documents or otherwise agreed to by the parties.

ARTICLE 6 - CONSTRUCTION ADMINISTRATION

A. Shop Drawings and Samples:

1. The Contractor shall submit Shop Drawings as required by the Construction Services Delivery Order, consisting of drawings, diagrams, illustrations, schedules, brochures, and other data which are prepared by the Contractor, subcontractor, manufacturer, supplier, or distributor and that depict that portion of the work.
2. The Contractor shall review and approve Shop Drawings prior to their submission to the A/E. Such review shall be for compliance with the requirements of the Construction Services Delivery Order and to ensure complete coordination of the work. Shop Drawings approved by the Contractor shall bear a stamp denoting that they have been reviewed and are "approved" or "approved as noted" or similar designation.

3. The Contractor shall submit the number of sets as specified in the Construction Services Delivery Order, or in the absence of a specification, submit enough copies for the Owner to retain two copies plus the number desired to be returned to the Contractor.
4. The A/E will review the Shop Drawings with reasonable promptness but only for conformity with the design and performance requirements as indicated in the Construction Services Delivery Order.
5. The Contractor shall submit samples as required by the Construction Services Delivery Order, consisting of physical examples furnished by the Contractor of sufficient size and quantity to provide an acceptable representation of the material proposed to be installed. Samples submitted will not be returned unless requested by Contractor and agreed to by the A/E. The Contractor shall pay shipping costs. The final installed product shall match the approved sample.

B. Materials and Workmanship:
1. The Contractor shall not allow the use of any asbestos containing product, whether temporary or permanent and whether or not incorporated or to be incorporated in the work, even if the products are non-friable and/or contain minimal amounts of asbestos, and even though such products may still be legally installed.
2. The Contractor shall not use or allow the use of lead materials in public water applications. Lead free solder, flux and pipe must be used in all public drinking water and waste water applications. Lead free solder and flux is defined as containing less than 0.2% lead while valves, pipes and appurtenances must contain less than 8.0% lead.
3. The Contractor warrants that unless otherwise specified or permitted by the Construction Services Delivery Order, all materials shall be new, in first class condition, and installed using workmanship of the highest quality in accordance with the Construction Services Delivery Order.
4. 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.
5. The Contractor accepts assignment of all 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 the storage, insurance, installation, and testing of items. 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,.

C. Inspection and Testing of Materials:
1. The Owner shall have performed and documented all inspections and tests required by the Construction Services Delivery Order.
2. The Contractor shall leave uncovered all areas of work that will be covered that are called out in the Construction Services Delivery Order to be left uncovered, or the A/E requests to be left uncovered prior to being inspected. The Contractor shall give adequate notice to the A/E of the time requested for an inspection of areas to be covered.
3. If the Contractor covers areas that were to be left uncovered, or otherwise fails to have performed the required inspections and tests, the Contractor shall cause the area to be uncovered for inspection and testing. After being inspected, the Contractor shall repair the area with craftsmen skilled in the appropriate trades needed for the repair at no additional cost to the Owner.

D. Substitutions:
1. The Contractor's requests for substitutions shall be submitted and negotiated prior to the execution of each Construction Services Delivery Order.

2. Wherever the Construction Services Delivery Order specifies a particular product, article, appliance, equipment, or material and it is designated by manufacturer and mode1 number, it is the intent to designate a level of quality, finish, appearance, function, or other factor that was desirable to have incorporated into the design. It is not intended to limit competition. Other manufacturer's listed as "approved equal" may be used, but the products by that manufacturer must meet or exceed the specification for the specified product. The Contractor must submit adequate information about the product to show that the submitted product meets the level of quality as the product specified.
3. If the Contractor desires to substitute a product for one that is not readily available due to extenuating circumstances, a request may be submitted for review to the A/E. Along with the product information submittal, the Contractor shall list the reason(s) for requesting the substitution, and the benefit to the State for accepting substituted product. The A/E's decision on the request is final.
4. The Contractor shall not substitute any product, article, appliance, equipment, or material that is specified without prior written approval from the A/E, which shall be granted only with the concurrence of the Owner.

E. Changes in the Work:
1. The Owner may authorize changes in the scope of a Construction Services Delivery Order without invalidating the Construction Services Deliver Order or this Contract by issuing a Construction Services Delivery Order Modification (Form SE-690) and the Contractor shall execute the changed work promptly.
2. Any changes in the work must be approved by the Owner and executed by Form SE-690 signed by the Contractor and A/E.
3. The cost of any Construction Services Delivery Order Modification shall be calculated using the same method as pricing the Construction Services Delivery Order.
4. In the absence of a total agreement concerning the item(s) for a Construction Services Delivery Order Modification, a change directive shall be issued and the Contractor shall proceed diligently with performance of the Construction Services Delivery Order.

F. Receiving and Storing Materials and Equipment:
1. The Contractor shall have an authorized person or persons to receive all items and shal1 properly unload, check for completeness of shipment, and in-transit damage.
2. The Contractor shall properly handle and store materials, supplies, equipment etc. in accordance with the Construction Services Delivery Order or manufacturers printed instructions for each product.
3. 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.

G. Schedule and Reports
1. At the time of approval of the Construction Services Delivery Order by the Owner, the Contractor shall present a construction schedule in a form satisfactory to the A/E. The schedule shall identify important tasks and identify the critical path.
2. The Contractor shall submit an up-dated progress schedule with each monthly request for payment showing scheduled dates and actual completion dates. If the work falls behind schedule, the Contractor shall present a plan for completion of the work by the time for completion.

H. Time for Completion:
1. The Time for Completion will be identified in each Construction Services Delivery Order, and will be the amount of time agreed to by the Owner and the contractor as: required for completion of the work of that Construction Services Delivery Order.
2. Requests for any extension of time shall be made monthly with the application for payment. Delays of the work due to circumstances beyond the control of the contractor shall be adequately documented and submitted to the Owner with any request for an extension of the Time for Completion.

3. The time for completion shown in the Construction Services Delivery Order shall include five (5) calendar days for delays due to inclement weather per calendar month. Delays due to weather beyond the five (5) days may be requested as a time extension to the time for completion. The Contractor shall submit job site weather data supporting the claim for an extension of time;
4. The A/E will promptly review each request for time extension. The A/E shall make a recommendation and the Owner shall approve or reject the request, and so inform the Contractor. Changes in Contract Time shall be documented on Form SE-690.
5. Should completion of the Construction Services Delivery Order extend past the original or amended Construction Services Delivery Order completion date, the Owner will calculate liquidated damages in the amount listed in the Construction Services Delivery Order and reduce the Contractor's final payment by that amount.

I. Guarantee:
1. The Contractor shall remedy and make well all defects in material and workmanship at no additional cost to the Owner and pay for any damage to other work or property resulting from such defects for a period of one year from the date of Substantial Completion excepting defects that are due to misuse or abuse by the Owner.
2. The issuance of a Certificate of Substantial Completion, **[SE-550][Other]**, does not relieve the Contractor from liability for defective workmanship or materials.
3. Where guarantees and/or warranties are required in the technical sections of the specifications, or as noted on the drawings, exceeding the one-year guarantee period, the extended warranty period will govern.
4. Nothing contained in this Article shall be construed to establish a period of limitation with respect to other obligations the Contractor might have under the Contract Documents.

J. Use of the Site:
1. The Contractor shall confine its operations to areas permitted by laws and ordinances, and as defined in the Construction Services Delivery Order. The site must be maintained in a reasonably clean condition, free of trash and debris. The Contractor shall, on a regular basis, remove from the site all trash, debris, tools and equipment no longer needed for the work.
2. The Contractor shall provide access to the work in progress for representatives of the Owner, A/E and for all authorities having jurisdiction over the work.

ARTICLE 7 - PAYMENTS

A. Payments by the Owner to the Contractor for acceptable work performed shall be made in accordance with Title 29, Chapter 6 of the SC Code of Laws, as amended.

B. Payments by the Contractor to Subcontractors for acceptable work performed shall be made in accordance with Title 29, Chapter 6 of the SC Code of Laws, as amended.

C. Payments by the Contractor and Subcontractors to laborers and others shall be made in accordance with Title 29, Chapter 7 of the SC Code of Laws, as amended.

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

E. If the Contractor intends to request progress payments, the Contractor shall submit to the A/E for its approval, a schedule of values showing the cost breakdown of the various divisions of work. The divisions of work shall be formatted using Construction Specifications Institute (CSI) format or a format agreed to by the A/E. The total of the schedule of values shall be the amount of the Construction Services Delivery Order and any modifications.

F. Any schedule of values that fails to include sufficient detail, is unbalanced, or exhibits "front-loading" of the value of the work shall be rejected.

G. The Contractor shall submit all applications for payment to the A/E. The A/E shall review the application to determine the amount due the Contractor, based on the approved schedule of values for the work listed in the application for payment and acceptably performed, and forward its certification to the Owner within seven days of receipt.

H. Applications for payment may include materials suitably stored on site for use in the work. Materials stored off site may be approved for payment providing the Contractor submits:
1. Documentation showing the location of the material;
2. Proof of purchase & delivery;
3. Certificate of insurance for the materia1 with adequate coverage showing the Owner as the certificate holder;

4. The material is stored in a bonded warehouse, segregated and posted with a sign designating ownership by the Owner.

I. The Owner shall retain funds from the applications for payment in the amount of 3.5% of the total requested. Retained funds shall be held until final completion of the Construction Services Delivery Order.

J. When the Contractor has fully performed the work of the Construction Services Delivery Order and has been granted a Certificate of Final Completion, **[SE-560][Other]**, the Contractor may submit its application for final payment and release of retained funds to the A/E. The request shall be accompanied by the Consent of Surety to Final Payment (for bonded Construction Services Delivery Orders), and Releases of Liens from all sub-contractors (if any). If the work is completed to the satisfaction of the A/E, the A/E shall certify the application and the Owner shall make final payment.

ARTICLE 8 – CLAIMS & DISPUTE RESOLUTION

A. Each party may assert a Claim requesting an adjustment of the Contract or Construction Services Delivery Order terms, an adjustment in the Construction Services Delivery Order sum, a change in the Construction Services Delivery Order time for completion, or other relief with respect to the terms of the Contract or Construction Services Delivery Order.

B. Claims under this Contract shall be submitted in writing. 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. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

C. Claims arising prior to the date final payment is due must be initiated within twenty-one (21) days after occurrence of the event giving rise to such Claim or within twenty-one (21) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. By failing to give written notice of a Claim within the time required by this paragraph, a party expressly waives its claim.

D. Pending a resolution of the Claim, including any dispute resolution under this Contract, the Contractor shall proceed to perform as required by the Construction Services Delivery Order and the Owner shall continue to make payments in accordance with this Contract.

E. The Contractor consents to be governed by § 11-35-4230 of the SC Code of Laws, as amended, and agrees that § 11-35-4230 applies to and governs the Contract. The Contractor waives any objection it may have now or hereafter to the administrative process required by § 11-35-4230. To the extent that § 11-35-4230, by its own terms, does not govern a claim or controversy arising out of or relating to the Contract, the Contractor agrees that any suit, action or proceeding arising out of or relating to the Contract shall be instituted and maintained only in a State or Federal court located in the County in which the Owner maintains its principle place of business, in the State of the South Carolina Budget & Control Board.

F. Contractor consents that any papers, notices, or process necessary or proper for the initiation or continuation of any 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 Postal Service.

G. Notwithstanding any other provision of the Contract Documents, 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. 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 law (viii) lost revenue and profit for lost use of the property, (ix) costs resulting from lost productivity or efficiency. 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 law; (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 Articles 9 or 10. 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.

H. Notwithstanding any other provision of the Contract Documents, 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.

I. DUTY OF COOPERATION:
   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 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.
   2. 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.

J. RESOLUTION OF DISPUTES:
   1. If a claim is not resolved pursuant to Section I above 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 J 2.
   2. If after meeting in accordance with the provisions of this Section, 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 this Article, all 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 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.
   3. If any party seeks resolution to a dispute pursuant to Section J 2 above, 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.

4. Without relieving any party from the other requirements of this Article, either party may initiate proceedings in the appropriate forum prior to initiating or completing the procedures required by Sections I above and J 1 if such action is necessary to preserve a claim by avoiding the application of any applicable statutory period of limitation or repose.

K. The Contractor agrees that any act by the Owner 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 States Constitution. As used in this paragraph, the phrase "the State" includes any governmental entity transacting business with the Contractor pursuant to the Contract and the South Carolina Budget & Control Board.

ARTICLE 9 - SUSPENSION OR TERMINATION BY OWNER

A. The Owner may direct the Contractor to suspend the Contractor's performance, in whole or in part, with or without cause, for such period as determined by the Owner at any time and without prior notice to the Contractor.

B. The Construction Services Delivery Order Sum will be adjusted for increases in cost to the Contractor due to the delay or interruption except that no increase will be granted for delays or interruptions that are, or would have been, the responsibility of the Contractor, or an equitable adjustment is covered under other provisions of the contract.

C. The Owner may terminate this Contract or any Construction Services Delivery Order under this Contract, in whole or in part, for the convenience of the State with not less than seven (7) days written notice to the Contractor. The Contractor shall be paid for all services acceptably performed up to the date of termination, costs incurred by reason of such termination, and any other adjustments otherwise allowed by the Contract.
   1. 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.
   2. 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:. (i) the termination was due to withdrawal of funding by the General Assembly, Governor, or Budget and Control Board or the need to divert project funds to respond to an emergency as defined by Regulation 19-445.2110(B) of the South Carolina Code of Regulations, as amended; (ii) funding for the reinstated portion of the work has been restored; (iii) circumstances clearly indicate a requirement for the terminated work; and (iv) reinstatement of the terminated work is advantageous to the Owner.

D. 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;
   4. otherwise is guilty of substantial breach of a provision of the Contract Documents;
   5. fails to commence the work of an approved Construction Services Delivery Order within seven (7) days of receipt of, or as stated on, the approved Construction Services Delivery Order.

E. If either party fails to substantially perform according to the terms of this Contract, the other party may terminate this Contract upon not less than seven (7) days written notice. The notice of termination shall set forth with specificity the grounds for termination and may, at the sole option of the terminating party, include a stated period of time in which it may cure the alleged breach.

F. If, after termination for cause, it is determined that the Owner lacked justification to terminate, 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.

ARTICLE 10 - SUSPENSION OR TERMINATION BY CONTRACTOR

A. The Contractor may suspend its performance under this Contract if the A/E has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents. Prior to the suspension of performance, the Contractor shall give written notice to the. Owner, and shall allow the Owner no fewer than twenty-one (21) calendar days to make payment, otherwise the suspension may take effect without further notice by the Contractor.

B. The Contractor may terminate the Contract, or Construction Services Delivery Order, upon seven (7) days' written notice to the Owner, if work is stopped through no fault of the Contractor, or other persons performing work either directly or indirectly for the Contractor, for a period of time exceeding forty five (45) consecutive calendar days due to a court order or other public authority having jurisdiction; or a National emergency which requires the work to be stopped.

ARTICLE 11 – PROTECTION OF PERSONS AND PROPERTY

A. The Contractor is responsible for jobsite safety for the protection of persons and property. The Contractor shall comply with all applicable laws, rules and regulations regarding safety including but not limited to Occupational Safety and Health Standards published by Occupational Safety and Health Administration; and U.S. Department of Labor publications or other jurisdictions having authority over the work.

B. For the duration of the project, the Contractor is to provide and maintain safety equipment as required for the protection of persons and property including but not limited to warning signs; lights; signal devices; barricades; guard rails; fences; and other devices intended for the safety of persons and protection of property.

C. If during execution of the work, the Contractor encounters material believed to be hazardous, including but not limited to: lead, asbestos or polychlorinated biphenyl (PCB), and that the Contractor has reasonable cause to believe creates a danger of bodily injury or death to persons, or serious losses to real or personal property, then the Contractor shall immediately stop work in the affected area and report the conditions to the Owner and the A/E in writing. Except by written agreement of the Owner and Contractor the Contractor shall not resume work until the hazardous material has been rendered harmless.

D. The Owner and Contractor hereby agree that this Article shall apply only to hazardous, toxic or radioactive materials or substances subject to the regulations of agencies having jurisdiction, such as, but not limited to, the S C. Department of Health and Environmental Control (SCDHEC), the U.S. Environmental Protection Agency (USEPA) and the U.S. Nuclear Regulatory Commission (USNRC).

E. Work in the affected area shall be resumed immediately following the occurrence of any of the following events;
   (1) the Owner causes remedial work to be performed that results in the absence of materials or substances; or
   (2) the Owner and the Contractor, by written agreement, decide to resume performance of the work; or
   (3) 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.

F. For the purposes of this Contract, the term "rendered harmless" shall be interpreted to mean that measured levels of verified hazardous, toxic or radioactive materials or substances are less than the applicable standards established by authorities having jurisdiction. In no event, however, shall the Owner have any responsibility for any substance or material that is brought to the project site by the Contractor, any Subcontractor, any material supplier, or any entity for whom any of them is responsible, unless such materials or substances were expressly required by the Construction Services Delivery Order. The Contractor agrees not to use any fill or other materials to be incorporated into the work that are hazardous, toxic, or radioactive, or made up of any items that are hazardous, toxic, or radioactive.

ARTICLE 12 - INSURANCE AND BONDS

A. The Contractor shall purchase and maintain insurance to protect against claims that may arise out of the Contractor's operations under the work of this Contract. The limits shall be for not less than the limits set forth in this Article, shall be written on an occurrence basis and shall be in force for the duration of the Contract.

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

(1) COMMERCIAL GENERAL LIABILITY:

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

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

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

(3) WORKER'S COMPENSATION:

(a)	State Statutory	
(b)	Employers Liability	$100,000 Per Accident $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 Article. The umbrella policy limits shall not be less than $3,000,000.

C. 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:

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

D. 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 Article, the certificate shall identify the types of insurance, state the limits of liability for each type of coverage, name the Owner and 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 and thereafter upon renewal or replacement of

such coverage until the expiration of the time required by this Article. 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.

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

F. 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.

G. 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 Construction Services Delivery Order Modification.

H. 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 Article. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to a Construction Services Delivery Order. 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.

I. 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 14, 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 Article covers and pays for the damage, except such rights as they have to proceeds of such insurance held by the Contractor as fiduciary.

J. 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 Article 12 O.

K. 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.

L. 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.

M. Before commencing any services hereunder, the Contractor shall provide the Owner with Performance and Payment Bonds, if required, each in an amount not less than the Delivery Order Cost as set forth in the Construction Services Delivery Order. 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.

N. 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.
   4. Separate Bonds shall be provided for each separate Construction Services Delivery Order and shall be provided for all Construction Services Delivery Orders exceeding $50,000 and for lesser amounts as requested by the Owner. The Contractor shall provide Performance and Labor and Material Payment Bonds in the amount of 100% of the amount of the Construction Services Delivery Order for each project to be done under the terms of this Contract.
   5. Notwithstanding the foregoing, any bonds required by this Contract shall meet the requirements of the SC Code of Laws, as amended.

O. The Contractor shall keep the Surety informed of the progress of the work and, where necessary, obtain the Surety's consent to, or waiver of:
   1. notice of changes in the work;
   2. request for reduction or release of retention;
   3. request for final payment; and
   4. any other item required by the Surety.

P. The Owner may, in the Owner's sole discretion, inform the Surety of the progress of the work and obtain consents as necessary to protect the Owner's rights, interest, privileges, and benefits under and pursuant to any bond issued in connection with the work.

ARTICLE 13 - CORRECTION OF WORK

A. The Contractor shall promptly and with due diligence, correct work rejected by the A/E or the Owner for failure to conform to the requirements of the Construction Services Delivery Order, whether such defective work is observed before or after Final Completion. The Contractor shall pay for correcting the deficient work including additional testing and inspections and any compensation for A/E services and expenses involved.

B. If the Contractor fails to carry out the work in accordance with the contract documents, and fails within a seven (7) day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies they may have, proceed to correct such deficiencies. In such case an appropriate change directive shall be issued deducting from payments to the Contractor the reasonable cost of correcting such deficiencies including the Owner's expenses and compensation to the A/E if necessary. In the event the deficiency is significant, and could pose a danger or create additional expense if not corrected immediately, the A/E may issue a written order to stop work on the project or portion thereof until the reason for the stoppage has been remedied.

C. The Contractor and the Surety remain liable for any excess cost or damages resulting from actions, set forth in this Article.

D. If the A/E so chooses, work that is not in conformance with the Construction Services Delivery Order may be accepted in lieu of the contractor removing and correcting the deficient work. Such acceptance of deficient work shall not include work that is in violation of any code requirements. An appropriate adjustment, as recommended by the A/E and agreeable to the Owner, shall be made to the Construction Services Delivery Order Cost. Such modification to the Construction Services Delivery Order Cost shall be made by change directive.

ARTICLE 14 - CONSTRUCTION BY OWNER

A. The Owner reserves the right to perform work with its own forces or award separate contracts for work on the same project as may be awarded by Construction Services Delivery Order under this Contract.

B. The Contractor agrees to allow access to the site by the Owner's work force or separate contractor(s), and agrees to assist in coordinating the progress of the work with the Owner.

C. The Owner shall have the responsibility to coordinate the activities of the various contractors working at the project location.

ARTICLE 15 – SUBCONTRACTORS

If the Contractor engages subcontractors to provide work on a Construction Services Delivery Order, then the Contractor shall include, or cause to be included, in the agreement with those entities, all provisions contained in this Contract and the Construction Services Delivery Order. Sub-contractors and Sub-subcontractors shall be bound by the same provisions as the Contractor and shall preserve and protect the rights of the Owner.

ARTICLE 16 - COMPLETION AND CLOSEOUT

A. The Contractor shall have completed the unfinished and defective work listed in the "punch list" and notify the A/E of its completion. The A/E will schedule a Final Inspection and require the Contractor to demonstrate that all equipment and systems operate as designed. The Owner may elect to have other persons, firms or agencies participate in the inspections.
B. Failure of the Contractor to achieve completion within the allowed time shall entitle the Owner to consider the Contractor in breach of the Contract.
C. If more than one final inspection is required, the Contractor shall reimburse the Owner for all costs associated with the re-inspection.
D. Final payment shall not be due and all retained funds shall not be released until the Contractor submits the following:
   1. Affidavit of Payment of Debts and Claims;
   2. Consent of Surety to Final Payment.

ARTICLE 17 – MISCELLANEOUS PROVISIONS

A. Drug-Free Workplace: The Contractor certifies to the Owner that Contractor will provide a Drug-Free Work-place, as required by Title 44, Chapter 107 of the South Carolina Code of Laws, as Amended.
B. Cancellation After Award: Pursuant to §11-35-1520 of the SC Code of Laws, as amended, and South Carolina Regulation 19-445.2085, this Contract or any Construction Services Delivery Order may be canceled after award, but prior to issuance of the Notice to Proceed. In such event, the Contractor shall recover, as its sole remedy, its reasonable Delivery Order Proposal preparation costs.
C. The Contractor and Owner each bind themselves, their partners, directors, officers, successors, executors, administrators, assigns and legal representatives in respect to all provisions of this Contract. Neither party shall assign, sublet or transfer their interest in this Contract without the written consent of the other party.
D. This Contract represents the entire and integrated agreement between the Owner and Contractor. It supersedes any and all prior and contemporaneous communications, representations and agreements, whether written or oral relating to the subject matter of this Contract
E. Nothing in this Contract shall be construed to give any rights, contractual relationship or benefit to a third party against either the Owner or the Contractor.
F. Nothing in this Contract shall prevent the Contractor from employing any independent consultant, associate, or subcontractor to assist in the Services.
G. Unless otherwise included in the Contract, nothing shall require the Contractor to discover, handle, remove, or dispose of any hazardous or toxic materials in any form at the project site.
H. PRICING DATA AND AUDIT:
   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 $100,000. 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 emergencies such adjustments may be made after final payment to the Contractor.

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.
3. Records Retention - the term "records" means any books or records that relate to cost or pricing data that Contractor is required to submit pursuant to Section H 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.

I. 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).

J. Economic Conflict of Interest: A contractor shall not have or exercise any official responsibility regarding a public contract in which the contractor, or a business with which he is associated, has an economic interest. A person working for contractor shall not have or exercise any official responsibility regarding a public contract in which the person, an individual with whom he is associated, or his family members have an economic interest. If contractor is asked by any person to violate, or does violate, either of these restrictions, contractor shall immediately communicate such information to the procurement officer. The state may rescind, and recover any amount expended as a result of, any action taken or contract entered in violation of this provision. The terms "business with which he is associated," "economic interest," "family member," "immediate family," "individual with whom he is associated," "official responsibility" and "person" have the meanings provided in Section 8-13-100.

K. 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.

L. 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)

M. INTELLECTUAL PROPERTY INDEMNITY: Without limitation and notwithstanding any other provision in this agreement, Contractor shall, upon receipt of notification, defend and indemnify the Indemnities against all actions, proceedings or claims of any nature (and for all damages, settlement payments, attorneys' fees, costs, expenses, losses or liabilities attributable thereto) by any third party asserting or involving Intellectual Property (IP) rights related to the Instruments of Service. Contractor's obligations under this paragraph do not apply to a claim to the extent (i) that the claim is caused by Contractor's compliance with a detailed, exact statement of particulars (such as a statement prescribing materials, dimensions, and quality of work) furnished by the State unless Contractor knew its compliance with the State's specifications would infringe an IP right, or

(ii) that the claim is caused by Contractor's compliance with a detailed, exact statement of particulars furnished by the State if the State knowingly relied on a third party's IP right to develop the specifications provided to Contractor and failed to identify such product to Contractor. State must reasonably cooperate with Contractor's defense of such claims or suits and, subject to Title 1, Chapter 7 of the South Carolina Code of Laws, may allow Contractor sole control of the defense, so long as the defense is diligently and capably prosecuted. State may participate in the defense of any action. Contractor's obligations under this clause shall survive the termination, cancellation, rejection, or expiration of this Agreement. "IP rights" means any rights protected by the laws governing patents, copyrights, trademarks, trade secrets, or any other proprietary rights. As used in this paragraph, "Indemnitees" means the State (including its instrumentalities, agencies, departments, boards, and political subdivisions), the contractor, the subcontractors at all tiers, and the officers, agents and employees of all the forgoing.

ARTICLE 18 - GOVERNING LAW

A. This Contract shall comply with South Carolina Law §11-35-3310 and related Statutes.
B. As required by §10-1-180 of the SC Code of Laws, as amended, the Office of State Engineer shall determine the enforcement and interpretation of all the applicable codes and referenced standards on state buildings.
C. Contractor shall refer any questions, comments or directives from local officials to the Owner and the Office of State Engineer for resolution.
D. 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.

ARTICLE 19 – OTHER PROVISIONS

A. **[N/A]**
B.

UNIVERSITY OF SOUTH CAROLINA

Facilities Business & Finance
Indefinite Delivery Contract
Request for Quotes

Project Name: _____

Contractor Subspecialty _____

State Project No.: _____ CP No.: _____

USC Project Coordinator: _____ Telephone No.: _____

Scope of Work:

Delivery Order Documents Available: ☐ Yes ☐ No

May Be Obtained From: _____

Mandatory Pre-Quote Conference: ☐ Yes ☐ No

Date: _____ Time: _____ Location: _____

RFQ Closing Date: _____ Time: _____

Location: _____ Attention: _____

NOTE: If quote exceeds $50,000, performance bonds and payment bonds will be required.

QUOTE FORM

Quote Submitted By: _____

Quote is submitted in accordance with IDC Contract _____ dated _____

Base Quote 1: $_____

Base Quote 2: $_____

Unit Pricing for Additional (if requested): $_____

Base Schedule: _____ (Start Date) _____ (End Date)

☐ At this time, the above mentioned company chooses not to bid.

ADDENDA (If Applicable) - The above signed acknowledges the receipt of the following addenda for this RFQ:

☐ Addendum #1 ☐ Addendum #2 ☐ Addendum #3 ☐ Addendum #4

This Quote is hereby submitted on behalf of the **offerer named above**

BY: _____ (Signature of Offerer's Representative) _____ (Print or Type Name of Offerer's Representative)

Date: _____

****Quotes that are received via fax will not be accepted****

2011 Edition

SE-680

Rev. 9/07/2011

Construction Services Delivery Order

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

CONTRACTOR: _____
Address: _____

Project Name: IDC of Mechanical Contracting Services
Agency IDC Contract No.: _____

State Project No.: H27-D157-NA
Agency Delivery Order No.: _____

COST AND SCHEDULE INFORMATION	DELIVERY ORDER	CONTRACT
Maximum Total Amount, this IDC:	N/A	$1,000,000.00
Maximum Total Amount, Delivery Oder:	N/A	$250,000.00
Amount, this Delivery Order:		N/A
Total Amount Previous Delivery Orders:	N/A	
Total Amount all Delivery Orders *(including current order*		
Balance Remaining for this IDC:		

Description of Delivery Order Scope: *(attach Contractor's Proposal* ____

List of Delivery Order Documents: *(refer to attachments as necessary)* ____

SCHEDULE

Date of Commencement: _____

Days Allowed: _____

Date of Substantial Completion: _____

Other Agency Information:

_____

The Agency and the Contractor hereby agree, as indicated by the signatures below, to the scope of work identified in the Contract Documents listed above, and to the Contractor's Cost Proposal dated the _____ day of _____, 20_____, and this Delivery Order shall be assigned to the Indefinite Delivery Contract identified above

NOTICE TO PROCEED is hereby given on this the _____ day of _____, 20_____. The Dates of Commencement and Substantial Completion are as noted above and shall be used for determining completion and the applicability of Liquidated Damages. Liquidated Damages in the amount of _____per day will be assessed for failure to complete the Work by the agreed upon date of completion. Failure to commence actual work on this Delivery Order within seven (7) days from the Date of Commencement will entitle the Agency to consider the Contractor non-responsible. In this event, the Agency may withdraw this Delivery Order and terminate the Contract in accordance with the Contract Documents.

AGENCY:

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

CONTRACTOR:

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

COMPLETION CERTIFICATION BY AGENCY:
Actual Completion Date:
Liquidated Damages Assessed: _____ **Date:**
(Signature of Agency Representative)
Title: _____

2011 Edition

SE-690

Rev. 10/10/2011

Construction Services Delivery Order Modification

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

CONTRACTOR: _____
Address: _____

Project Name: IDC of Mechnical Contracting Services
Agency IDC Contract No.: _____
Delivery Order Modification No.: _____

State Project No.: H27-D157-NA
Agency Delivery Order No.: _____

COST AND SCHEDULE INFORMATION

	DELIVERY ORDER	CONTRACT
Maximum Total Amount, this IDC:	N/A	$1,000,000.00
Maximum Total Amount, Delivery Orders:	N/A	$250,000.00
Current Amount, this Delivery Order:		N/A
Additional Amount, this Modification.:		N/A
Adjusted Amount, this Delivery Order:		N/A
Total Authorized to date, all other Delivery Orders:		
Total Authorized to date :*(including this modification)***:**		
Balance Remaining for this IDC:	N/A	

SCHEDULE

Date of Commencement: _____

Initial Days Allowed: _____

Additional Days Allowed: _____

Revised Date of Substantial Completion:

_____

Description of Modification Scope: *(attach Contractor's Proposal* ____

List of Modification Documents: *(refer to attachments as necessary)* ____

Other Agency Information

_____

The Agency and the Contractor hereby agree, as indicated by the signatures below, to the revised scope of work identified in the Modification Documents listed above, and to the Contractor's Cost Proposal dated the ____ day of _____, 20____, and this Delivery Order Modification shall be assigned to the Indefinite Delivery

AGENCY:

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

CONTRACTOR:

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

SE-355 2011 Edition

Performance Bond

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

Name: _____
Address: _____
_____

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

Name: _____
Address: _____
_____

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

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

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

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

State Project Name: USCA B&E Chiller Replacement Constructi
State Project Number: H27-D157-NA
Brief Description of Awarded Work, as found on the SE-330, Bid Form: Demolition of existing chiller and installation of new owner purchased chiller

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

Name: GMK & Associates, Inc.
Address: 1201 Main Street
Columbia, SC 29201

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

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

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

CONTRACTOR	SURETY
By: _____ (Seal)	By: _____ (Seal)
Print Name: _____	Print Name: _____
Print Title: _____	Print Title: _____ (Attach Power of Attorney)
Witness: _____	Witness: _____

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

Performance Bond

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. Definitions

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

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

SE-357
Rev. 8/9/2011

Labor and Material Payment Bond

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

Name: _____
Address: _____
_____

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

Name: _____
Address: _____
_____

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

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

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

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

Project Name: USCA B&E Chiller Replacement Constructio
Project Number: H27-D157-NA
Brief Description of Awarded Work, as found on the SE-330, Bid Form: Demolition of existing equipment and installation of new owner purchased equipment

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

Name: GMK & Associates, Inc
Address: 1201 Main Street
Columbia, SC 29201

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

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

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

CONTRACTOR	SURETY
By: _____ (Seal)	By: _____ (Seal)
Print Name: _____	Print Name: _____
Print Title: _____	Print Title: _____ (Attach Power of Attorney)
Witness: _____	Witness: _____

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

SE-357

Rev. 8/9/2011

Labor and Material Payment Bond

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

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Agency to pay for all labor, materials and equipment required for use in the performance of the Contract, which is incorporated herein by reference.

2. With respect to the Agency, this obligation shall be null and void if the Contractor:

2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants; and

2.2 Defends, indemnifies and holds harmless the Agency from all claims, demands, liens or suits by any person or entity who furnished labor, materials or equipment for use in the performance of the Contract.

3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

4. With respect to Claimants, and subject to the provisions of Title 29, Chapter 5 and the provisions of §11-35-3030(2)(c) of the SC Code of Laws, as amended, the Surety's obligation under this Bond shall arise as follows:

4.1 Every person who has furnished labor, material or rental equipment to the Contractor or its subcontractors for the work specified in the Contract, and who has not been paid in full therefore before the expiration of a period of ninety (90) days after the date on which the last of the labor was done or performed by him or material or rental equipment was furnished or supplied by him for which such claim is made, shall have the right to sue on the payment bond for the amount, or the balance thereof, unpaid at the time of institution of such suit and to prosecute such action for the sum or sums justly due him.

4.2 A remote claimant shall have a right of action on the payment bond upon giving written notice by certified or registered mail to the Contractor within ninety (90) days from the date on which such person did or performed the last of the labor or furnished or supplied the last of the material or rental equipment upon which such claim is made.

4.3 Every suit instituted upon a payment bond shall be brought in a court of competent jurisdiction for the county or circuit in which the construction contract was to be performed, but no such suit shall be commenced after the expiration of o ne year after the day on which the last of the labor was performed or material or rental equipment was supplied by the person bringing suit.

5. When the Claimant has satisfied the conditions of paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:

5.1 Send an answer to the Claimant, with a copy to the Agency, within sixty (60) days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

5.2 Pay or arrange for payment of any undisputed amounts.

5.3 The Surety's failure to discharge its obligations under this paragraph 5 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a claim. However, if the Surety fails to discharge its obligations under this paragraph 5, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs to recover any sums found to be due and owing to the Claimant.

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

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

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

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

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

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

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

13. **DEFINITIONS**

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

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

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

USC SUPPLEMENTAL GENERAL CONDITIONS
FOR CONSTRUCTION PROJECTS

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

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

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

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

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

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

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

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

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

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

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

12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least one (1) times per week. Construction waste must not be placed in University dumpsters. The construction site must be thoroughly cleaned with all trash picked up and properly disposed of on a daily basis and the site must be left in a safe and sanitary condition each day. The University will inspect job sites regularly and will fine any contractor found to be in violation of this requirement an amount up to $1,000.00 daily per violation.

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

14. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 6' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 3" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone if USC Arborist determines that construction may decrease amount of moisture needed to sustain health of tree(s).

15. Contractor shall water trees and other landscape material as directed by USC Arborist until site is returned to Owner.

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

17. For projects requiring heavy loads to cross walks, tree root zones or lawns on a regular basis (as determined by USC Project Manager), a construction entry road consisting of 10' X 16' oak logging mats placed on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep matting structurally functional.

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

Contractor Vehicle Requirements on Campus

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

2. All motorized vehicle traffic on USC walkways must first be authorized by USC Grounds Department and USC Project Manager. Violators may be subject to fines and penalties.

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

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

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

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

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

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

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

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

SECTION 01066 - INTERIM LIFE SAFETY MEASURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interim Life Safety Measures

1.02 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Submit a written plan indicating that Interim Life Safety Measures (ILSM) have been addressed and shall be enforced, within two weeks of Notice to Proceed .

1.03 PROCEDURES

A. The Interim Life Safety Measures shall:
1. Ensure that exits provide free and unobstructed egress. Personnel shall receive training if alternative exits are designated. Buildings and areas under construction shall have maintained escape facilities for the Contractor's work forces at all times. Means of egress in construction areas shall be inspected daily.
2. Ensure the fire alarm, detection, and suppression systems are properly functioning and are not impaired.
3. Ensure that temporary construction partitions are smoke tight and built of noncombustible materials that will not contribute to the development or spread of fire.
4. Provide additional fire-fighting equipment and use training for personnel.
5. Prohibit smoking in or adjacent to construction areas.
6. Develop and enforce storage, housekeeping, and debris removal practices that reduce the flammable and combustible fire load of the building to the lowest level necessary for daily operations.
7. Conducting a minimum of two fire drills per shift per quarter.
8. Increase "hazard surveillance" of buildings, grounds and equipment with special attention to excavations, construction areas, construction storage, and field offices.
9. Train personnel when structural or compartmentalize features of fire safety are compromised.
10. Conduct organization-wide safety education programs to ensure awareness of Life Safety Code deficiencies, construction hazards, and these requirements.

END OF SECTION

SECTION 01200 - PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Documentation of changes in Contract Sum and Contract Time.

C. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

D. The Contractor's Construction Schedule and Submittal Schedule are included in other sections of Division 1.

E. See also the payment requirements in Supplementary Conditions.

F. Change procedures.

G. Correlation of Contractor submittals based on changes.

H. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

A. Form to be used: AIA G703 - 1992.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. Submit Schedule of Values in duplicate within 21 days after date of Owner-Contractor Agreement.

E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.
   1. Provide minimum of 1% of the Construction Cost for Project Record Drawings.
   2. Provide minimum of 1% of the Construction Cost for Operating and Maintenance Data.
   3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

F. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
   1. Contractor's construction schedule.
   2. Application for Payment form.
   3. List of Subcontractors.
   4. List of principal suppliers and fabricators.
   5. Schedule of submittals.

G. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

H. Identification: Include the following Project identification on the Schedule of Values:
   1. Project name and location.
   2. Name of the Architect.
   3. Contractor's name and address.
   4. Date of submittal.

I. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

J. Include within each line item, a direct proportional amount of Contractor's overhead and profit.

K. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

L. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

M. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values.

N. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Form to be used: AIA G702-1992.

C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

D. Forms filled out by hand will not be accepted.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
   1. List of Subcontractors.
   2. List of principal suppliers and fabricators.
   3. Schedule of Values.
   4. Contractor's Construction Schedule (preliminary if not final).
   5. Schedule of principal products.
   6. Submittal Schedule (preliminary if not final).
   7. List of Contractor's staff assignments.
   8. List of Contractor's principal consultants.
   9. Copies of building permits.
   10. Copies of authorizations and licenses from governing authorities for performance of the Work.
   11. Initial progress report.
   12. Report of pre-construction meeting.

13. Certificates of insurance and insurance policies.
14. Performance and payment bonds (if required).
15. Data needed to acquire Owner's insurance.
16. Initial settlement survey and damage report, if required.

F. For each item, provide a column for listing each of the following:
1. Item Number.
2. Description of work.
3. Scheduled Values.
4. Previous Applications.
5. Work in Place and Stored Materials under this Application.
6. Authorized Change Orders.
7. Total Completed and Stored to Date of Application.
8. Percentage of Completion.
9. Balance to Finish.
10. Retainage.

G. Execute certification by signature of authorized officer.
1. Incomplete applications will be returned without action.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

J. Submit three copies of each Application for Payment.

K. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

L. Include the following with the application:
1. Transmittal letter as specified for Submittals in Section 01300.
2. Construction progress schedule, revised and current as specified in Section 01325.
3. Affidavits attesting to off-site stored products.

M. Waiver Delays: Submit each Application for Payment with the Contractor's waiver of mechanics lien for the period of construction covered by the application.

N. When an application shows completion of an item, submit final or full waivers.

O. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

P. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

Q. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Test/adjust/balance records.
4. Meter readings.
5. Start-up performance reports.
6. Change-over information related to Owner's occupancy, use, operation and maintenance.
7. Final cleaning.
8. Application for reduction of retainage, and consent of surety.
9. Advice on shifting insurance coverages.

R. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

1.04 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to the Contract Documents.

B. For minor changes not involving an adjustment to the Contract Price or Contract Time, Architect will issue instructions directly to Contractor.

C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
2. Promptly execute the change.

D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 14 days.

E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.

F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
3. For pre-determined unit prices and quantities, the amount will based on the fixed unit prices.

4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

G. Substantiation of Costs: Provide full information required for evaluation.
   1. Provide following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
   3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.

H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

K. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

A. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of Work covered by the application who could lawfully be entitled to a lien.

B. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

C. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
   1. Completion of Project closeout requirements.
   2. Completion of items specified for completion after Substantial Completion.
   3. Assurance that unsettled claims will be settled.
   4. Assurance that Work not complete and accepted will be completed without undue delay.
   5. Transmittal of required Project construction records to Owner.
   6. Certified property survey.
   7. Proof that taxes, fees and similar obligations have been paid.

8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access.

D. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01700.

END OF SECTION

SECTION 01300 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Number of copies of submittals.

E. Submittal procedures.

1.02 PROJECT COORDINATION

A. During construction, coordinate use of site and facilities through the Project Coordinator.

B. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

C. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

D. Coordinate field engineering and layout work under instructions of the Project Coordinator.

E. Make the following types of submittals to Architect through the Project Coordinator:
1. Requests for interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Design data.
6. Manufacturer's instructions and field reports.
7. Applications for payment and change order requests.
8. Progress schedules.
9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

C. Agenda:
1. Execution of Owner-Contractor Agreement.

2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, Owner, and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
7. Scheduling.

D. Contractor to record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum weekly intervals on day and time convenient for all parties involved.

B. Make arrangements for meetings, prepare agenda with copies for participants prior to meetings, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers as appropriate to agenda topics for each meeting. The Architect and Owner may attend.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of status of Request for Information (RFI).
7. Review of status of Architectural Supplemental Instructions (ASI).
8. Review of status of proposal requests (PR).
9. Review of status of Change Orders (CO).
10. Review of off-site fabrication and delivery schedules.
11. Maintenance of progress schedule.
12. Corrective measures to regain projected schedules.
13. Planned progress during succeeding work period.
14. Coordination of projected progress.
15. Maintenance of quality and work standards.
16. Effect of proposed changes on progress schedule and coordination.
17. Other business relating to Work.

E. Record minutes and distribute copies within five days after meeting to participants, with three copies to Architect, one copy to Owner, participants, and those affected by decisions made.

3.03 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.

a. When product data submittals are prepared specifically for this project (in the absence of standard printed information) submit such information as shop drawings and not as product data submittals.
b. Content:
    1) Identify the particular product being submitted; submit only pertinent pages.
    2) Show compliance with properties specified.
    3) Identify which options and accessories are applicable.
    4) Show compliance with the specific standards referenced.
    5) Show compliance with specified testing agency listings; show the limitations of their labels or seals, if any.
    6) Identify dimensions which have been verified by field measurement.
    7) Show special coordination requirements for the product.

2. Shop drawings.
    a. Original drawings, prepared by Contractor, Subcontractor, supplier or distributor, which illustrate portion of the work, showing fabrication, layout, setting and erection details.
    b. Do not reproduce the Contract Drawings for the shop drawing submittals. Electronic media of the Construction Documents are not available for the Contractor's Subcontractor's, or material suppliers use.
    c. Identify details by reference to drawing sheet number(s) and pertinent detail number(s).
    d. Shop drawings shall not include the phrase by others, except when relating to materials, products or equipment not included under the total Contract.
3. Samples.
    a. Provide samples that are the same as proposed product.
    b. Where products are to match a sample prepared by other entities, prepare sample to match.
    c. Preparation:
        1) Attach a description to each sample.
        2) Attach name of manufacturer or source to each sample.
        3) Where compliance with specified properties is required, attach documentation showing compliance.
        4) Where selection is required, the first submittal may be a single set of all options; after return of submittal with selection indicated, submit standard number of sets of selected item.
    d. Keep final sample set(s) at the project site, available for use during progress of the work.
    e. Contractor shall be responsible for submitting all interior and exterior materials samples that require a color and/or finish selection or is required to be part of a mock up assembly at the same time. The Contractor shall include the color, finish, material selection schedule in the shop drawing submittal schedule. The Architect will provide final color, finish, and material selections only when they have all been submitted by the Contractor.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - CLOSEOUT SUBMITTALS.

D. A Sequence of Operations will be required to be submitted and reviewed by the Owner and Engineer. Refer to Division 15 specifications for requirements.

3.04 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.05 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.06 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit the number of copies that Contractor requires, plus two copies that will be retained by Architect.
   2. Larger Sheets, Not Larger Than 30x42 inches: Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.

B. Documents for Information: Submit two copies.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.07 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810, in duplicate.
   1. Submittals received without a transmittal form will be returned without review or action.
   2. Fill out a separate transmittal form for each submittal; also include the following:
      a. Other relevant information.
      b. Requests for additional information.
   3. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

B. Identify Project name and numbers, Contractor's, Subcontractor's or supplier's name and address, Architect's name and address, Manufacturer's name ; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

C. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, quantities, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
   1. Contractor’s responsibility regarding errors and omissions in submittals is not relieved by Architect’s review of submittals.
   2. Contractor’s responsibility regarding deviations in submittals from requirements of Contract Documents is not relieved by Architect’s review submittals, unless Architect gives written acceptance of specific deviations as approved by Owner.
   3. When work is directly related and involves more than one trade, shop drawings shall be coordinated by the submitting Contractor/Subcontractor with other trades prior submission and related work submitted under one cover.
      a. After shop drawing has been submitted for review, no changes may be made to that Drawing other than changes resulting from review notes made by the Architect unless such changes are clearly identified and circled before being resubmitted. Any failure to comply with this requirement shall nullify and invalidate the Architect’s review.
   4. Submittals without Contractor’s stamp of review will not be reviewed and will be returned for resubmission.

D. Submittals will be accepted from the Contractor only. Submittals received from other entities will be returned without review or action.

E. Do not submit substitute items that have not been approved by means of the procedure specified elsewhere.

F. Do not include requests for substitution (either direct or indirect) on submittals; comply with procedures for substitutions specified elsewhere.

G. Deliver submittals to Architect at business address.

H. Schedule submittals to expedite the Project, and coordinate submission of related items.
   1. Prepare and submit, in accordance with the approved Project Construction Schedule, a separate document listing dates by which shop drawings, product data and samples must be submitted for each material, product or equipment item requiring submittal.
   2. The schedule shall reflect an orderly sequence so as to cause no delay in the Work.
   3. Coordinate submittals and activities that must be performed in sequence, so that the

Architect has enough information to properly review the submittals.

4. Coordinate submittals of different types for the same product or system so that the Architect has enough information to properly review each submittal.
5. The dates indicated shall allow reasonable time for the review process of checking, correcting and resubmitting and reasonable time for procurement.
6. No extension of time will be granted to the Contractor/Subcontractor because of failure to expeditiously submit shop drawings and samples in reasonable time to allow for review process.
7. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor. Architect shall review with reasonable promptness.

I. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

J. Provide space for Contractor and Architect review stamps. Submittals to receive Architect's action marking: Provide blank space on the label or on the submittal itself for action marking; 4 inches wide by 6 inches high.

K. Do not commence work which requires review of any submittals until receipt of returned submittals with an acceptable action.
   1. Stamped Reviewed, no corrections or resubmissions required, fabrication may proceed.
   2. Stamped Revise and Resubmit.
      a. If Contractor/Subcontractor complies with noted corrections, fabrication may proceed.
   3. If for any reason the Contractor/Subcontractor cannot comply with the noted corrections, fabrication shall not proceed and Contractor/Subcontractor shall resubmit, following procedures outlined herein before.
   4. Stamped Revise and Resubmit or Resubmit.
      a. Contractor/Subcontractor shall revise and resubmit for review. Fabrication shall not proceed.

L. When revised for resubmission, identify all changes made since previous submission.

M. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

N. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01325 - CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

C. Reports.

1.02 SUBMITTALS

A. Within 7 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 45 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 3 working days.

C. Within 10 days after date established in Notice to Proceed, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 3 days after Architect's review, submit complete schedule.

E. Submit Daily Construction Reports every week.

F. Submit updated schedule and Progress Reports with each Application for Payment.

G. Submit the number of opaque reproductions that Contractor requires, plus three copies that will be retained by Architect.

H. Submit under transmittal letter form specified in Section 01300.

1.03 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.04 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

B. Diagram Sheet Size: Maximum 22 x 17 inches or width required.

C. Sheet Size: Multiples of 8-1/2 x 11 inches.

D. Scale and Spacing: To allow for notations and revisions.

1.05 COORDINATION

A. In preparation of schedules, take into account the time allowed or required for the Architect's administrative procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Provide sub-schedules to define critical portions of the entire schedule.

E. Include conferences and meetings in schedule.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.

H. Indicate delivery dates for owner-furnished products.

I. Coordinate content with schedule of values specified in Section 01200.

J. Provide legend for symbols and abbreviations used.

K. Use the same terminology as that used in the Contract Documents.

3.03 BAR CHARTS

A. Include a separate bar for each major portion of Work or operation.

B. Identify the first work day of each week.

C. Coordinate each element on the schedule with other construction activities.

D. Show activities in proper sequence.

E. Include cost bar at top of chart, showing estimated and actual costs of work performed at the date of each application for payment.

F. Use vertical lines to mark the time scale at not more than one week intervals.

3.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Provide construction schedule in the form of bar charts:
   1. Use the same items of work as shown in the schedule of values.

2. Where related activities must be performed in sequence, show relationship graphically.
3. Incorporate the submittal schedule specified elsewhere.
4. Incorporate the quality control activities schedule specified elsewhere.
5. Show dates of:
   a. Each activity that influences the construction time.
   b. Preconstruction meeting.
   c. Ordering dates for products requiring long lead time.
   d. Completion of demolition.
   e. Completion of mechanical work.
   f. Completion of electrical work.
   g. Instruction of the Owner's personnel in operation and maintenance of equipment and systems.
   h. Substantial and final completion, with time frames for the Architect's completion procedures.
6. In developing the schedule take into account:
   a. Continued occupancy of areas adjacent to the work area as well as throughout the building.
   b. Interruption of services to occupied facilities
   c. Site limitations

3.05 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

F. Submit progress reports required to support recommended changes.

3.06 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules and reports to Contractor's project site file, to Subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in schedules.

3.07 REPORTS

A. Daily Construction Logs: Every day, record the following information concerning events at the site:
   1. Approximate number of persons at the site.
   2. Visitors to the site.
   3. Modifications to the contract received; modifications implemented.
   4. Changes in occupancy.

5. Delays; reasons for delay.
6. Emergencies and accidents.
7. Equipment and system start-ups and tests.
8. Losses of material and property.
9. Meetings held and significant decisions made there.
10. Names of Subcontractors at site.
11. Orders and requests of representatives of governing authorities.
12. Unusual events.
13. Utility service disconnections and connections.

B. Progress Reports: Prepare a narrative report describing the general state of completion of the work and describing in detail the following:
1. Actual and anticipated delays, their impact on the schedule, and corrective actions taken or proposed.
2. Actual and potential problems.
3. Status of change order work.
4. Effect of delays, problems, and changes on the schedules of Subcontractors.
5. Outstanding change proposal requests.
6. Status of corrective work ordered by the Architect

END OF SECTION

SECTION 01400 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Mock-ups.

C. Control of installation.

D. Tolerances.

E. Testing and inspection services.

F. Manufacturers' field services.

1.02 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008.

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2011.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2009.

D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2010.

E. ASTM E329 - Standard Specification for Agencies Engaged Construction Inspection and/or Testing; 2011.

F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2009.

1.03 SUBMITTALS

A. Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Owner's information.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.

b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Conformance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit report within 10 days of observation to Architect for information.
2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.04 TESTING AND INSPECTION AGENCIES

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:
1. Testing agency: Comply with requirements of ASTM E329, ASTM E 548, ASTM E543, ASTM C1021, ASTM C1077, and ASTM C1093.
2. Inspection agency: Comply with requirements of ASTM D3740, ASTM E329, and ASTM E548.
3. Laboratory: Authorized to operate in South Carolina.
4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST

established Measurement Assurance Program, under a laboratory measurement quality assurance program.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:

1. Test samples of mixes submitted by Contractor.
2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
6. Perform additional tests and inspections required by Architect.
7. Submit reports of all tests/inspections specified.

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

D. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
3. Provide incidental labor and facilities:
   a. To provide access to Work to be tested/inspected.
   b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
   c. To facilitate tests/inspections.
   d. To provide storage and curing of test samples.
4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report observations and site decisions or instructions given to applicators or installers that

are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

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

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

END OF SECTION

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Procedures for Owner-supplied products.

F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

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

B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

C. Cord and Plug: Provide minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Substitutions will not be considered when a product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

D. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.
5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. The Architect will notify Contractor in writing of decision to accept or reject request.

G. Substitution Request Form:
1. SUBSTITUTIONS WILL BE CONSIDERED ONLY WHEN THE ATTACHED FORM IS COMPLETED AND INCLUDED WITH THE SUBMITTAL WITH ALL BACK-UP DATA.

3.02 OWNER-SUPPLIED PRODUCTS

A. See Section 01100 - Summary for identification of Owner-supplied products.

B. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

C. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.

G. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

H. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01610 - SUPPLEMENT A - SUBSTITUTION REQUEST FORM

TO: JEFF BERNAGOZZI

GMK Associates, Inc.

1201 Main Street, Suite 2100

Columbia, South Carolina 29201

fax: 803.255.7243

We hereby submit for your consideration the following product instead of the specified item for the above project:

DRAWING NO._____ DRAWING NAME_____

SPEC. SECT.	SPEC NAME	PARAGRAPH	SPECIFIED ITEM
_____	_____	_____	_____

Proposed Substitution:_____

Attached complete information on changes to Drawings and/or Specifications, which proposed substitution would require for its proper installation.

Submit with request necessary samples and substantiating data to prove equal quality and performance to that which is specified. Clearly mark manufacturer's literature to indicate equality in performance.

The undersigned certifies that the function, appearance and quality are of equal performance and assumes liability for equal performance, equal design and compatibility with adjacent materials.

Submitted By:

_____ _____

Signature Title

_____

Firm

_____

Address

_____ _____

Telephone Date

Signature shall be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

_____

For use by the Architect: For use by the Owner:

__ Recommended __ Recommended as noted	__ Approved
__ Not Recommended __ Received too late	__ Not Approved
__ Insufficient data received	__ Approved as noted
By:	By:
Date:	Date:

_____

Fill in Blanks Below:

A. Does the substitution affect dimensions shown on Drawings: Yes___No___ If yes, clearly indicate changes._____

B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution? Yes ___ No ___ If no, fully explain:_____

C. What affect does substitution have on other Contracts or other trades?
_____

D. What affect does substitution have on construction schedule?
_____

E. Manufacturer's warranties of the proposed and specified items are: ___ Same ___ Different (If Different, Explain on Attachment)

F. Reason for Request: _____

G. Itemized comparison of specified item(s) with the proposed substitution; list significant variations:_____
_____

H. Accurate cost data comparing proposed substitution with product specified:
_____

I. Designation of maintenance services and sources:
_____

(Attach additional sheets if required.)

END OF SECTION

SECTION 01700 - EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Pre-installation meetings.

D. Cutting and patching.

E. Cleaning and protection.

F. Starting of systems and equipment.

G. Demonstration and instruction of Owner personnel.

H. Closeout procedures, except payment procedures.

I. General requirements for maintenance service.

1.02 REFERENCE STANDARDS

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
1. On request, submit documentation verifying accuracy of survey work.
2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
3. Submit surveys and survey logs for the project record.

C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
1. Structural integrity of any element of Project.
2. Integrity of weather exposed or moisture resistant element.
3. Efficiency, maintenance, or safety of any operational element.
4. Visual qualities of sight exposed elements.
5. Work of Owner or separate Contractor.
6. Include in request:
   a. Identification of Project.
   b. Location and description of affected work.
   c. Necessity for cutting or alteration.
   d. Description of proposed work and products to be used.
   e. Alternatives to cutting and patching.
   f. Effect on work of Owner or separate Contractor.
   g. Written permission of affected separate Contractor.
   h. Date and time work will be executed.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

A. For survey work, employ a land surveyor registered in South Carolina and acceptable to Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.

1.05 PROJECT CONDITIONS

A. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

B. Provide methods, means and facilities to prevent water intrusion into new construction and renovations. Eliminate standing water immediately. Remove wet materials and replace with new.

C. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

D. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
   3. Clean interior spaces prior to the start of the finish painting and continue cleaning on an as-needed basis until painting is finished.
   4. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
   5. Handle materials in a controlled manner with as little handling as possible; do not drop or throw materials from heights.

E. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

F. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

G. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

H. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 PRE-CONSTRUCTION

A. Meet with management staff of the area of construction for required infection control practices in that department and comply with the Owner's policies.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01600.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Building shall be enclosed, ventilated and sealed from the exterior prior to installation of interior finish materials.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.

3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01500 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.
   3. Relocate items indicated on drawings.
   4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
   2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
   3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
      a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
      b. See Section 01100 for other limitations on outages and required notifications.
      c. Provide temporary connections as required to maintain existing systems in service.
   4. Verify that abandoned services serve only abandoned facilities.
   5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

H. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.

I. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

J. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.

K. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.

L. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

M. Refinish existing surfaces as indicated:

N. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.

O. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

P. Clean existing systems and equipment.

Q. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

R. Do not begin new construction in alterations areas before demolition is complete.

S. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.

8. Remove and replace defective and non-conforming work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07840, to full thickness of the penetrated element.

J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
2. Match color, texture, and appearance.
3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

K. Meet with management staff of the area of construction for required infection control practices in that department and comply with the Owner's policies.

3.08 PROGRESS CLEANING

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

B. Contractor shall assess the amount of air borne dust and debris for construction and apprise the Owner of the need to change the air filtration filters in the air handling system at an increased frequency.

C. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

D. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

E. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

F. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

G. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or

sanitary drains.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect and owner seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.

B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

D. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of owner personnel.

E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

G. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Testing, adjusting, and balancing HVAC systems: See Section 15950.

3.13 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Materials:
1. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
2. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
3. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.
4. Sweeping compounds used in cleaning operations shall leave no residue on concrete floor surfaces that may effect installation of finish flooring materials.

C. Execute final cleaning prior to final project assessment.
1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

D. Use cleaning materials that are nonhazardous.

E. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

G. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels, and other foreign materials from sight-exposed interior surfaces.

H. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

I. Dust cabinetwork and remove markings.

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

K. Tunnels and closed off spaces shall be cleaned of packing boxes, wood frame members and other waste materials used in the construction.

L. The entire system of piping and equipment shall be cleaned internally. The Contractor installing those items shall open all dirt pockets and strainers, completely blowing down as required and clean strainer screens of all accumulated debris.

M. Tanks, fixtures and pumps shall be drained and proved free of sludge and accumulated matter.

N. Temporary labels, stickers, etc., shall be removed from fixtures and equipment. (Do not remove permanent name plates, equipment model numbers, ratings, etc.)

O. Heating and air conditioning equipment, tanks, pumps and traps shall be thoroughly cleaned and new filters or filter media installed.

P. Before being placed in service, domestic water distribution systems, including those for cold water, drinking water and the hot water system shall be chlorinated. The method to be used shall be at the option of the Contractor installing the systems, and one of the methods set forth in the AWWA Standard specifications, latest edition, including all amendments thereto. The treatment shall consist of a solution of not less than 50 parts per million of available chlorine. The chlorinating material shall be either liquid chlorine or sodium hypochloride. After sterilization the system shall be flushed with clear water until the chlorine residual is not greater than 0.2 per million.

Q. Clean filters of operating equipment.

R. Clean debris from roofs, gutters, downspouts, and drainage systems.

S. Clean site; sweep paved areas, rake clean landscaped surfaces.

T. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

A. Contract requirements shall be met when construction activities have successfully produced, in this order, these three terminal activities:
   1. Substantial Completion.
   2. Final Completion.
   3. Final Payment.

B. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

C. Substantial Completion:
   1. The date of Substantial Completion of the Work or designated portion thereof is the date certified by the Architect when construction is sufficiently complete, in

accordance with the Contract Documents, so the Owner may occupy the Work or designated portion thereof for the use for which it is intended.

2. When the Contractor considers the Work is substantially complete, he shall submit to the Architect:
   a. A written notice that the Work, or designated portion thereof, is substantially complete.
   b. A list of items to be completed or corrected, (herein after referred to as Punch List).
   c. Request Substantial Completion Observation at a mutually agreeable date.
3. Within a reasonable time after receipt of such notice, the Architect, the Contractor, and at his option, the Owner, will make an observation to determine the status of completion.
4. Should the Architect determine that the Work is not substantially complete:
   a. The Architect will promptly notify the Contractor in writing, giving the reasons thereof.
   b. The Contractor shall remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Architect.
   c. The Architect will re-observe the Work and the cost of the Architect's time and reimbursable expenses will be charged to the Contractor.
5. When the Architect concurs that the Work is substantially complete, he will:
   a. Prepare a Certificate of Substantial Completion on AIA Form G704, accompanied by the Contractor's Punch List of items to be completed or corrected, as verified and amended by the Architect. (Note: Contract responsibilities are not altered by inclusion or omission of required work from the Punch List.)
   b. Submit the Certificate to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.
6. The Contractor shall complete or correct all items identified on the Punch List and required by the Contract requirements within time limits established by the Certificate.
7. Notify Architect when work is considered ready for Substantial Completion.
8. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
9. Owner will occupy portions of the building as specified in Section 01100.
10. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

D. Final Completion:
   1. To attain final completion the Contractor shall complete activities pertaining to Substantial Completion, and complete work on punch list items. Only then shall he issue written request to the Architect for Final Observation.
   2. When the Contractor considers the Work is complete, he shall submit written certification that:
      a. Contract Documents have been reviewed.
      b. Work has been inspected for compliance with Contract Documents.
      c. Work has been completed in accordance with Contract Documents.
      d. Equipment and systems have been tested in the presence of the Owner's representative and are operational.

e. Work is completed and ready for final observation.

3. The Architect, the Contractor and the Owner will make an observation to verify the status of completion with reasonable promptness after receipt of such certification.
4. Should the Architect consider that the Work is incomplete or defective:
   a. The Architect will promptly notify the Contractor in writing, listing the incomplete or defective work.
   b. The Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to the Architect that the Work is complete.
   c. The Architect will reinspect the Work.
5. When the Architect finds that the Work is acceptable under the Contract Documents, he shall request the Contractor to make closeout submittals.

E. The Contractor's Closeout Submittals to the Architect:
   1. Evidence of compliance with requirements of governing authorities:
      a. Certificate of Occupancy
      b. Certificates of Inspection
      c. Mechanical
      d. Electrical
   2. Project Record Documents: To requirements of Section 01780.
   3. Operating and Maintenance Data, Instructions to the Owner’s Personnel: To requirements of Section 01780.
   4. Warranties and Bonds: To requirements of individual sections.
   5. Spare Parts and Maintenance Materials: To requirements of individual sections.
   6. Evidence of Payment and Release of Liens: To requirements of General and Supplementary Conditions.

F. Final Adjustment of Accounts:
   1. Submit a final statement of accounting to the Architect.
   2. Statement shall reflect all adjustments to the Contract Sum:
      a. The original Contract Sum.
      b. Additions and deductions resulting from:
         1) Previous Change Orders.
         2) Deductions for uncorrected Work.
         3) Deductions for reinspection payments.
         4) Other adjustments.
      c. Total contract sum, as adjusted.
      d. Previous payments
      e. Sum remaining due.
   3. Architect will prepare a final Change Order, reflecting adjustments to the Contract Sum which were not previously made by Change Orders.

G. Final Application for Payment:
   1. The Contractor shall submit the final Application and Certificate for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01780 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Section 01700 - Execution Requirements: Contract closeout procedures.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect prior to claim for final Application for Payment.

B. Operation and Maintenance Data:
1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 15 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.
4. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties.

Submit a draft to the Owner through the Architect for approval prior to final execution.

5. Refer to individual Sections of Divisions-2 through -16 for specific content requirements, and particular requirements for submittal of special warranties.
6. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor,subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
7. Bind warranties and bonds in two (or more) duplicate heavy-duty, commercial quality, durable 3-hole punch tab binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
8. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
9. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.
10. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction,

referenced to visible and accessible features of the Work.
2. Field changes of dimension and detail.
3. Details not on original Contract drawings.

3.02 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

E. Manuals:
1. Purpose:
a. Operation and maintenance manuals will be used for training of, and use by, Owner’s personnel in operation and maintenance of mechanical and electrical systems and equipment. A separate manual or chapter within a manual shall be prepared for each class of equipment or system.
b. For additional requirements refer to various specification sections.

F. Instructions of Owner’s Personnel
1. Fully instruct Owner’s designated operating and maintenance personnel in operating, adjustments and maintenance of all mechanical and electrical systems and equipment as required by respective and pertinent sections, after all final inspection, tests and repairs have been completed.
2. Operating and maintenance manuals shall constitute the basis of instructions. Contents of manual shall be reviewed in full detail, explaining all aspects of operations and maintenance.
3. Prepare and include additional data when need for such data becomes apparent during instruction and training and sessions.
4. Training sessions shall be jointly arranged with Owner during Contractor’s normal week and daily hours. The Owner shall have the responsibility of scheduling its shift work personnel accordingly.
5. Owner and Contractor shall coordinate and cooperate to keep training sessions to a reasonable minimum.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning

agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Include test and balancing reports.

O. Safety instructions.

P. Additional Requirements: As specified in individual product specification sections.

3.05 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder on the front and the spine with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide heavy duty paper tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.

J. Provide a listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

K. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect, Consultants, and Contractor with name of responsible parties; schedule of

products and systems, indexed to content of the volume.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder on the front and the spine with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

I. See all provisions under "3.5 WARRANTY:" in General Conditions.

J. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

K. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, guarantee the corrected work with a new warranty equal to the original.

L. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

M. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

N. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit

selections to products with warranties not in conflict with requirements of the Contract Documents.

O. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

END OF SECTION

SECTION 02223 - MINOR DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of designated building equipment and fixtures.

B. Removal of designated construction.

C. Disposal of materials.

1.02 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped utilities.
   1. Indicate unanticipated structural, electrical, or mechanical conditions.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.

B. Obtain required permits from authorities.

C. Do not close or obstruct egress from any building exit or site exit.

D. Do not disable or disrupt building fire or life safety systems without 5 days' prior written notice to Owner.

E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.04 SCHEDULING

A. Schedule work under the provisions of Section 01325.

B. Arrange schedule so as not to interfere with the Owner's operations.

C. Schedule work to coincide with new construction.

D. Describe demolition removal procedures and schedule.

1.05 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

C. Occupancy:
   1. The Owner will continue to occupy portions of the existing building.
   2. Adjacent spaces will not be vacated during demolition activities.

D. Existing Conditions:
   1. After the project is begun, the Contractor is responsible for the condition of structures to be demolished. The Owner does not warrant that the condition of structures to be

demolished will not have changed since the time of inspection for bidding purposes.

E. Unforeseen Conditions: Should unforeseen conditions be encountered that affect design or function of project, investigate fully and submit an accurate, detailed, written report to the architect. While awaiting the architect's response, reschedule operations if necessary to avoid delay of overall project.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION

3.01 EXAMINATION

A. Survey existing conditions and correlate with drawings and specifications to determine extent of demolition required.

B. Insofar as is practicable, arrange operations to reveal unknown or concealed structural conditions for examination and verification before removal or demolition.

C. Perform continuing surveys as the work progresses to detect hazards resulting from demolition or construction activities.

D. Verify actual conditions to determine in advance whether removal or demolition of any element will result in structural deficiency, overloading, failure, or unplanned collapse.

3.02 PREPARATION

A. Provide for the protection of persons passing around or through the area of demolition.

B. Erect and maintain weatherproof closures for exterior openings.

C. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued building occupancy. Insulate to provide noise protection to occupied areas.

D. Construct temporary partitions in a manner at least equal to the following (or superior, if necessary to provide effective protection specified):
   1. Gypsum-board surfaces adjacent to occupied areas, with joints taped.

E. Protect existing materials that are not to be demolished.

F. Prevent movement of structure; provide bracing and shoring.

G. Notify affected utility companies before starting work and comply with their requirements.

H. Mark location and termination of utilities.

I. Provide appropriate temporary signage including signage for exit or building egress.

J. Damages: Without cost to the Owner and without delay, repair any damages caused to facilities to remain.

3.03 POLLUTION CONTROLS

A. Control as much as practicable the spread of dust and dirt.

B. Observe environmental protection regulations.

C. Do not allow water usage that results in freezing or flooding.

D. Do not allow adjacent improvements to remain to become soiled by demolition operations.

3.04 DEMOLITION

A. Disconnect, remove, and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members.

C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

D. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.

E. Remove temporary facilities.

F. Remove: Unless items are otherwise indicated to be reinstalled or salvaged, remove and scrap.

G. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare for service; reinstall in the same location (or in the location indicated).

H. Remove and Install New: Remove and dispose of items indicated and install new items in the same location (or in the location indicated).

I. Remove and Salvage: Items indicated to be salvaged will remain the Owner's property. Carefully remove and clean items indicated to be salvaged; pack or crate to protect against damage; identify contents of containers; deliver to the locations indicated.

J. Remove and Scrap: Remove and dispose of items indicated.
   1. All demolished or removed items and materials shall be considered scrap except for those indicated to remain, those indicated to be reinstalled, and those indicated to be salvaged.
   2. Items of value to the contractor:
      a. Do not store removed items on site.

K. Existing to Remain: Construction or items indicated to remain shall be protected against damage during demolition operations. Where practicable, and with the Architect's permission, the Contractor may elect to remove items to a suitable storage location during demolition and then properly clean and reinstall the items.

L. Detailed requirements for cutting are specified under cutting and patching in Division 1.

M. Perform work in a systematic manner.

N. Demolish and remove existing construction only to the extent required by new construction and as indicated in the contract documents.

O. Perform selective demolition using methods which are least likely to damage work to remain and which will provide proper surfaces for patching.

P. Remove debris daily.

Q. Masonry: Detach masonry to be demolished from adjoining construction to remain with power-driven masonry saws or hand tools.

R. Use any methods permitted by governing regulations and the requirements of the contract documents.

3.05 REPAIRS AND PATCHING

A. Perform repairs in accordance with patching requirements specified in Division 1 under cutting and patching.

3.06 CLEANING

A. Remove tools and equipment. Dispose of scrap.

B. Broom clean interior areas.

C. Clean soil, smudges, and dust from surfaces to remain.

D. Leave exterior areas free of debris.

E. Return structures and surfaces to remain to condition existing prior to commencement of demolition.

END OF SECTION

SECTION 15010 - GENERAL MECHANICAL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work under Division 15 shall include furnishing of all labor, accessories, tools, equipment and material required to completely execute installation of the entire chilled water system as shown on the drawings and as specified. Work shall include but not be limited to the furnishing, unloading, handling distribution, setting, supporting and installation of all components required for the mechanical systems.

B. Drawings shall not be scaled. Refer to architectural and structural drawings for building construction and dimensions and to room finish schedule on architectural drawings for material, finish and construction method of walls, floor and ceiling in order to insure proper rough-in and installation of work.

1.02 REFERENCES

A. FM P7825 - Approval Guide; Factory Mutual; 1995.

B. NEMA MG 1 - Motors and Generators; 1993 (and Revision 1).

C. NFPA 70 - National Electrical Code; 2005

D. SSPC-Paint 15 - Steel Joist Shop Paint; Steel Structures Painting Council; Part of Painting Manual, Vol 2.

E. ASME American Society of Mechanical Engineers

F. ASTM American Society for Testing Materials

G. NEMA National Electrical Manufacturers Association

H. NFPA National Fire Protection Association

I. OSHA Occupational Safety and Health Act

J. SMACNA Sheet Metal and Air Conditioning Contractors National Association, Inc.

K. IBC International Building Code 2009

L. IMC International Mechanical Code 2009

M. IPC International Plumbing Code 2009

N. IFC International Fire Code 2009

O. IECC - International Energy Conservation Code - 2006 Edition

P. ASHRAE 90.1-2004 Edition

1.03 Interpretation of Contract Documents:

A. Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any item, in the drawings or specifications or both, carries with it the instruction to furnish and install the item, regardless of whether or not this

instruction is explicitly stated as part of the indication or description.

B. It shall be understood that the specifications and drawings are complimentary and are to be taken together for a complete interpretation of the work.

C. No exclusions from, or limitations in, the language used in the drawings or specifications shall be interpreted as meaning that the appurtenances or accessories necessary to complete any required system or item of equipment are to be omitted

D. The drawings of necessity utilize symbols and schematic diagrams to indicate various items of work. Neither of these have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed in accordance with the diagrammatic intent expressed on the drawings, and in conformity with the dimensions indicated on final architectural and structural working drawings and on equipment shop drawings.

E. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

F. Certain details appear on the drawings which are specific with regard to the dimensioning and positioning of the work. These details are intended only for the purpose of establishing general feasibility. They do not obviate field coordination for the intended work.

G. Information as to the general construction shall be derived from structural and architectural drawings and specifications only.

H. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.

1.04 PERFORMANCE REQUIREMENTS

A. Work shall be installed to conform with any City or State law, regulation, code, ordinance, ruling or Fire Underwriters requirement applicable to this class of work.

B. All installations for construction purposes shall conform with the Department of Labor "Safety and Health Regulations for Construction".

C. All equipment with electrical components shall bear the UL label.

1.05 SUBMITTALS

A. Documents will not be accepted for approval unless:
   1. They are listed in the specifications as an approved manufacturer or approval has been obtained prior to bid.
   2. They include complete information pertaining to appurtenances and accessories.
   3. They are properly marked with service or function identification as related to the project where they consist of catalog sheets displaying other items which are not applicable, and are marked with pertinent specification paragraph number.

PART 2 PRODUCTS

2.01 Materials and Manufacturers:

A. Equipment and materials installed under this contract shall be new and without blemish or

defect.

B. Each major component of equipment shall have the manufacturer's name, address, model number and rating on a plate securely affixed in a conspicuous place. The nameplate of a distributing agent will not be acceptable. ASME Code Ratings, UL label, or other data which is die-stamped into the surface of the equipment shall be stamped in a location easily visible.

C. In all cases the contractor shall be completely responsible for changes in dimension of other than first named manufacturer equipment, electrical changes, etc. required for proper function and final performance. Item shall comply with all requirements herein set forth and as required to perform as designed.

2.02 Specified Materials:

A. Throughout the drawings and specifications, equipment and systems have been selected and are referenced by name, manufacturer, model number, etc. These references are not intended to limit competition. Products by other listed manufacturers will be acceptable.

B. If a listed manufacurer other that the basis of design is used, it is the contractor's responsiblity for changes in dimension, structural, electrical changes, etc. required for proper installation, function and final performance.

2.03 Substitution of Specified Materials:

A. Throughout the drawings and specifications, equipment and systems have been selected and are referenced by name, manufacturer, model number, etc. These references are not intended to limit competition and in most cases materials and methods of construction equal to that specified will be accepted provided prior approval of any substitute item is obtained from the Architect/Engineer. Only products by the listed manufacturers will be acceptable. Contractors and other manufacturers may submit requests to be listed as an acceptable manufacturer on the specified item by submitting documentation to the Engineer. All bidders will be notified by addendum of any approved substitutions. Under no circumstances will any substitutes be accepted after that date; and any item installed on the job which has not been approved in accordance with the noted procedure shall be removed and replaced with the appropriate approved item at the contractor's expense.

B. In all cases the contractor shall be completely responsible for changes in dimension of other than first named manufacturer equipment, electrical changes, etc. required for proper function and final performance. Item shall comply with all requirements herein set forth and as required to perform as designed.

PART 3 EXECUTION

3.01 Protection of Equipment:

A. Protect all materials and equipment from damage during storage at the site and throughout the construction period.

B. Protection from damage from rain, dirt, sun and ground water shall be accomplished by storing the equipment on elevated supports and covering them on all sides with protective rigid or flexible water proof coverings securely fastened.

C. Piping shall be protected by storing it on elevated supports and capping the ends with suitable material to prevent dirt accumulation in the piping.

3.02 COORDINATION OF WORK

A. All work shall be coordinated to avoid conflict with other contractors.

B. The contractor shall be responsible for checking to insure that the equipment to be installed will fit in the space shown on the drawings. If there is a conflict, the contractor shall notify the Engineer before bid. By submitting a bid the contractor assures that the equipment to be installed will fit or that previsions have been included in the bid to move the equipment to a location where it can be installed without conflict.

C. The Contractor shall review and coordinate the casework and millwork shop drawings to determine the location of sinks, range hoods, refrigerators, lab equipment, etc., and rough-in and install any and all items shown on the plans.

3.03 Contiguous Work:

A. If any part of the Contractor's work is dependent for its proper execution or for its subsequent efficiency or appearance on the character or conditions of contiguous work not executed by him, this contractor shall examine and measure such contiguous work and report to the Architect in writing any imperfection therein, or conditions that render it unsuitable for the reception of this work. Should the contractor proceed without making such written report, he shall be held to have accepted such work and the existing conditions and he shall be responsible.

3.04 Certificates of Inspection and Approval:

A. Upon completion of work, furnish to the Owner certificates of inspection or approval from the authorities having jurisdiction if certificates of inspection or approval are required by law or regulation.

3.05 Sleeves and Openings:

A. Furnish, locate, install, and fireproof all sleeves and openings required for installation of the work.

3.06 Access to Equipment and Valves:

A. All control devices, specialties, valves and removable panels on equipment shall be so located as to provide easy access for inspection and maintenance, including removal of any interior components.

B. Should any work, such as piping, ducts, conduit, etc. be installed without due regard to the accessibility of devices installed by other contractors, the installation shall be relocated, offset or rerouted without cost to the Owner.

3.07 Cutting and Patching:

A. Perform all cutting and patching required for installation of the work.

3.08 Welding:

A. Welders shall be qualified as prescribed by Section IX of the ASME Boiler Code. All weld joints shall conform to ANSI/ASME B-31.1.

3.09 Project Closeout:

A. Maintenance Manuals: At the end of construction, furnish to the Architect three (3) bound and indexed sets of maintenance and operating instructions, parts lists, electrical wiring diagrams, balance data, and manufacturer's literature sufficient for operation and complete maintenance of all equipment by the Owner.

B. Approved submittals and shop drawings shall be included in the Maintenance Manuals instead of being separately furnished, if desired.

C. It is intended that the documentation provided in maintenance manuals, along with as-built drawings, shall be complete and detailed enough to permit and facilitate troubleshooting, engineering analysis, and design work for future changes, without extensive field investigations and testing. Manuals shall be prepared so as to explain system operation and equipment to those not acquainted with the job.

D. Manuals shall be durably bound and clearly identified on the front cover (and on the spine of thick volumes). Identification shall include the building or project name, applicable trade (such as HVAC, Plumbing, Fire Protection, etc.), approximate date of completion (month and year) and contractor's name.

E. Manuals shall be organized into well defined and easy to locate sections, with index tabs or separators to divide the sections. A complete table of contents shall be provided at the front indicating the section or page number for each system, subsystem, or supplier/manufacturer.

F. Manuals shall include complete information and diagrams on all controls, indicators, sensors, and signal sources. Control diagrams are to show the locations of components and major equipment by room number or other identification when room numbers are not applicable. Locations of out-of-sight components, such as duct mounted sensors, flow switches, etc. should be clearly indicated. Control diagrams must include identification of components by make and model number, operating ranges, recommended set points, reset schedules, and other job-specific data useful for troubleshooting, calibration and maintenance. Complete narrative descriptions of operating sequences of control systems and subsystems shall be included on the prints adjacent to the corresponding schematics. Catalog data and cuts shall be clearly marked to indicate model numbers, sizes, capacities, operating points, and other characteristics of each item used. This should include accessories or special features provided. Where various sizes or variations of a series or model are used, documents should clearly show which are used where. Where quantities are appropriate, schedule of usage should be provided. Maintenance literature shall include complete information for identifying and ordering replacement parts, such as illustrated parts breakdowns.

G. Maintenance manuals must include complete balance data on all systems.

3.10 Instructions to Owner:

A. Contractor shall conduct a maintenance and operational instruction session for the Owner. Where highly technical or complex equipment is supplied, such as chillers and control

systems, manufacturer's representatives, controls subcontractors, and other appropriate personnel who are particularly qualified, shall conduct training sessions pertaining to their equipment, or systems. Such training shall be scheduled with the Owner in advance.

3.11 Spare Filters:

A. Spare filters shall be delivered to Owner's representative.

3.12 Warranties:

A. This Contractor warrants the mechanical systems to be free of defects in materials and workmanship for a period of one year after date of final payment. The effective dates of this warranty apply to all components of the mechanical systems regardless of any equipment manufacturer's warranties which may expire at an earlier date. Any system malfunctions, or any previously undiscovered non-compliance with the plans and specifications, during the warranty period shall be repaired at no cost to the Owner.

B. Deliver to Owner all warranties, guarantees, etc. and obtain written receipts.

END OF SECTION

SECTION 15066 - VARIABLE FREQUENCY CONTROLLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable frequency controllers.

1.02 RELATED SECTIONS

A. Section 15075 - Mechanical Identification

1.03 REFERENCES

A. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems; National Electrical Manufacturers Association; 1995.

B. NEMA ICS 7 - Industrial Control and Systems: Adjustable Speed Drives; National Electrical Manufacturers Association; 1993.

C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2005.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

C. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

D. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Local representative
   2. Emergency instructions
   3. Recommended spare parts
   4. Spare parts lists
   5. Operating instructions
   6. Maintenance instructions, including preventative and corrective maintenance.
   7. Copies of warranties
   8. Wiring diagrams
   9. Shop drawings and product data

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to components, enclosure, and finish.

1.07 MAINTENANCE SERVICE

A. Provide service and maintenance of controller for one year from Date of Substantial Completion.

1.08 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Provide 1 extra VFD of each size supplied as a spare drive to be stored by the owner

C. Furnish two of each air filter.

PART 2 PRODUCTS (FOR REFERENCE ONLY. EQUIPMENT PROVIDED BY OWNER.)

2.01 MANUFACTURERS

A. ABB

B. Substitutions: See Section 01600 - Product Requirements.

2.02 DESCRIPTION

A. Variable Frequency Controllers: Enclosed controllers suitable for operating the indicated loads, in conformance with requirements of NEMA ICS 7. Select unspecified features and options in accordance with NEMA ICS 3.1.
   1. Employ microprocessor-based inverter logic isolated from power circuits.
   2. Employ pulse-width-modulated inverter system.
   3. Design for ability to operate controller with motor disconnected from output.
   4. Design to attempt five automatic restarts following fault condition before locking out and requiring manual restart.

B. Finish: Manufacturer's standard enamel.

2.03 OPERATING REQUIREMENTS

A. Displacement Power Factor: Between 1.0 and 0.95, lagging, over entire range of operating speed and load.

B. Operating Ambient: 0 degrees C to 40 degrees C.

C. Volts Per Hertz Adjustment: Plus or minus 10 percent.

D. Current Limit Adjustment: 60 to 110 percent of rated.

E. Acceleration Rate Adjustment: 0.5 to 30 seconds.

F. Deceleration Rate Adjustment: 1 to 30 seconds.

G. Input Signal: 4 to 20 mA DC.

H. Harmonic current content less than 5%.

2.04 COMPONENTS

A. Display: Provide integral digital display to indicate output voltage, output frequency, and output current.

B. Status Indicators: Separate indicators for overcurrent, overvoltage, ground fault, overtemperature, and input power ON.

C. Furnish HAND-OFF-AUTOMATIC selector switch and manual speed control.

D. Include undervoltage release.

E. Control Power Source: Integral control transformer.

F. Door Interlocks: Furnish mechanical means to prevent opening of equipment with power connected, or to disconnect power if door is opened; include means for defeating interlock by qualified persons.

G. Safety Interlocks: Furnish terminals for remote contact to inhibit starting under both manual and automatic mode.

H. Control Interlocks: Furnish terminals for remote contact to allow starting in automatic mode.

I. Emergency Stop: Use dynamic brakes for emergency stop function.

J. Disconnecting Means: Include integral fused disconnect switch on the line side of each controller.

K. Wiring Terminations: Match conductor materials and sizes indicated.

L. Manual Speed Control Potentiometer to set speed in the manual mode.

M. Minimum and maximum speed adjustment potentiometers.

N. Isolation transformer or live filters to guarantee compliance with FCC Rule 15, subpart J and IEEE STD 519-1981.

O. Speed indicating meter, calibrated in per cent speed, to indicate speed of the converter-powered motor.

P. Status lights for all normal and alarm functions.

Q. 120 volt control transformer and instrument outlet.

R. Voltmeter - 0-500 volt scale.

S. Over temperature trip and alarm light.

T. Ammeter - corresponding to motor rating.

U. Short circuit and ground fault protection.

V. Frequency meter - 0-120 Hz scale.

W. Manual - Auto bypass with across the line magnetic motor starter - To operate motor at

constant speed.

X. Elapsed time meter to totalize converter running time.

2.05 SOURCE QUALITY CONTROL

A. Shop inspect and perform standard productions tests for each controller.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface is suitable for controller installation.

B. Do not install controller until building environment can be maintained within the service conditions required by the manufacturer.

C. Verify that field measurements are as indicated on shop drawings.

3.02 INSTALLATION

A. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.

B. Tighten accessible connections and mechanical fasteners after placing controller.

C. Provide fuses in fusible switches; refer to Section 16491 for product requirements.

D. Provide engraved plastic nameplates; refer to Section 16075 for product requirements and location.

E. Neatly type label inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place in clear plastic holder.

3.03 ADJUSTING

A. Make final adjustments to installed controller to assure proper operation of load system. Obtain performance requirements from installer of driven loads.

3.04 DEMONSTRATION

A. Demonstrate operation of controllers in automatic and manual modes.

END OF SECTION

SECTION 15073 - VIBRATION AND SEISMIC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vibration isolators.

B. Seismic restraints.

1.02 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. See Section 15010 - General Mechanical, for additional submittal procedures.

C. Product Data: Provide schedule of vibration isolator type with location and load on each.

D. Shop Drawings: Indicate inertia bases and locate vibration isolators, with static and dynamic load on each. Indicate seismic control measures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Isolation Technology, Inc: www.isolationtech.com.

B. Kinetics Noise Control, Inc: www.kineticsnoise.com.

C. Mason Industries: www.mason-ind.com.

2.02 VIBRATION ISOLATION AND SEISMIC RESTRAINTS

A. General:
   1. Housekeeping Pads
      a. Housekeeping pad reinforcement and monolithic pad attachment to the structure details and design shall be prepared by the restraint vendor if not already indicated on the drawings.
      b. Housekeeping pads shall be coordinated with restraint vendor and sized to provide a minimum edge distance of ten (10) bolt diameters all around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings. If cast-in anchors are to be used, the housekeeping pads shall be sized to accommodate the ACI requirements for bolt coverage and embedment.
   2. Supplementary Support Steel
      a. Contractor shall supply supplementary support steel for all equipment, piping, ductwork, etc. including roof mounted equipment, as required or specified.
   3. Attachments:
      a. Contractor shall supply restraint attachment plates cast into housekeeping pads, concrete inserts, double sided beam clamps, etc. in accordance with the requirements of the vibration vendor’s calculations.

B. Specification Type “A”
   1. Two layers of 3/4" (19mm) thick neoprene pad consisting of 2" (50mm) square waffle modules separated horizontally by a 16 (1.5mm) gauge galvanized shim. Load

distribution plates shall be used as required.

2. Mason Industries, Inc. type Super “W”

C. Specification Type “B”
   1. Bridge-bearing neoprene mountings shall have a minimum static deflection of 0.2" (5mm) and all directional seismic capability. The mount shall consist of a ductile iron casting containing two separated and opposing molded neoprene elements. The elements shall prevent the central threaded sleeve and attachment bolt from contacting the casting during normal operation. The shock absorbing neoprene materials shall be compounded to bridge-bearing specifications. Mountings shall have an Anchorage Preapproval ”OPA” Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings.
   2. Mason Industries, Inc. type BR

D. Specification Type “E”
   1. Spring isolators shall be free standing and laterally stable without any housing and complete with a molded neoprene cup or 1/4" (6mm) neoprene acoustical friction pad between the baseplate and the support. All mountings shall have leveling bolts that must be rigidly bolted to the equipment. Spring diameters shall be no less than 0.8 of the compressed height of the spring at rated load. Springs shall have a minimum additional travel to solid equal to 50% of the rated deflection. Submittals shall include spring diameters, deflection, compressed spring height and solid spring height.
   2. Mason Industries, Inc. type SLF

E. Specification Type “F”
   1. Restrained spring mountings shall have an SLF mounting as described in Specification 5, within a rigid housing that includes vertical limit stops to prevent spring extension when weight is removed. The housing shall serve as blocking during erection. Installed and operating heights are equal. A minimum clearance of 1/2" (12mm) shall be maintained around restraining bolts and between the housing and the spring so as not to interfere with the spring action. Restraining Bolts shall have a neoprene bushing between the bolt and the housing. Limit stops shall be out of contact during normal operation. Since housings will be bolted or welded in position there must be an internal isolation pad.Housing shall be designed to resist all seismic forces. Mountings shall have Anchorage Preapproval “OPA” Number from OSHPD in the state of California certifying the maximum certified horizontal and vertical load ratings.
   2. Mason Industries, Inc. type SLR or SLRS.

F. Specification Type “J”
   1. Hangers shall consist of rigid steel frames containing minimum 1 1/4" (32mm) thick neoprene elements at the top and a steel spring with general characteristics as in specification 5 seated in a steel washer reinforced neoprene cup on the bottom. The neoprene element and the cup shall have neoprene bushings projecting through the steel box. To maintain stability the boxes shall not be articulated as clevis hangers nor the neoprene element stacked on top of the spring. Spring diameters and hanger box lower hole sizes shall be large enough to permit the hanger rod to swing through a 30 arc from side to side before contacting the rod bushing and short circuiting the spring. Submittals shall include a hanger drawing showing the 30 capability.

2. Mason Industries, Inc. type 30N.

G. Specification Type “JA”
   1. Hangers shall be as described in J, but they shall be supplied with a combination rubberand steel rebound washer as the seismic upstop for suspended piping, ductwork, equipment and electrical cabletrays. Rubber thickness shall be a minimum of 1/4” (6mm). Submittals shall include a drawing of the hanger showing the installation of the rebound washer.
   2. Mason Industries, Inc. type RW30N.

H. Specification Type “K”
   1. Hangers shall be as described in J, but they shall be precompressed and locked at the rated deflection by means of a resilient seismic upstop to keep the piping or equipment at a fixed elevation during installation. The hangers shall be designed with a release mechanism to free the spring after the installation is complete and the hanger is subjected to its full load. Deflection shall be clearly indicated by means of a scale. Submittals shall include a drawing of the hanger showing the 30 capability.
   2. Mason Industries, Inc. type PC30N.

I. Specification Type “M”
   1. Seismic solid braces shall consist of steel angles or channels to resist seismic loads with a minimum safety factor of 2 and arranged to provide all directional restraint. Seismic solid brace end connectors shall be steel assemblies that swivel to the final installation angle and utilize two through bolts to provide proper attachment. Seismic solid brace assembly shall have anchorage preapproval “OPA” number from OSHPD in the state of California verifying the maximum certified load ratings.
   2. Mason Industries, Inc. type SSB, SSBS or SSRF.
   3. Specifications M applies to trapeze as well as clevis hanger locations. At trapeze anchor locations piping must be shackled to the trapeze.
   4. Specification M applies to hanging equipment as well.

J. Specification Type “N”
   1. Steel angles, sized to prevent buckling, shall be clamped to pipe or equipment rods utilizing a minimum of three ductile iron clamps at each restraint location when required. Welding of support rods is not acceptable. Rod clamp assemblies shall have an Anchorage Preapproval “OPA” Number from OSHPD in the State of California.
   2. Mason Industries, Inc. type SRC or UC.
   3. Specifications N applies to trapeze as well as clevis hanger locations. At trapeze anchor locations piping must be shackled to the trapeze.
   4. Specification N applies to hanging equipment as well.

K. Specification Type “O”
   1. Pipe clevis cross bolt braces are required in all restraint locations. They shall be special purpose preformed channels deep enough to be held in place by bolts passing over the cross bolt. Clevis cross braces shall have an Anchorage Preapproval “OPA” Number from OSHPD in the State of California.
   2. Mason Industries, Inc. type CCB.

L. Specification Type “P”

1. All-directional seismic snubbers shall consist of interlocking steel members restrained by a one-piece molded neoprene bushing of bridge bearing neoprene. Bushing shall be replaceable and a minimum of 1/4" (6mm) thick. Rated loadings shall not exceed 1000 psi (.7kg/mm2). A minimum air gap of 1/8" (3mm) shall be incorporated in the snubber design in all directions before contact is made between the rigid and resilient surfaces. Snubber end caps shall be removable to allow inspection of internal clearances. Neoprene bushings shall be rotated to insure no short circuits exist before systems are activated. Snubbers shall have an Anchorage Preapproval "OPA" Number from OSHPD in the State of California verifying the maximum certified horizontal and vertical load ratings.
2. Mason Industries, Inc. type Z-1225.

M. Specification Type "R"
1. Stud wedge anchors shall be manufactured from full diameter wire, not from undersized wire that is "rolled up" to create the thread. The stud anchor shall also have a safety shoulder which fully supports the wedge ring under load. The stud anchors shall have an evaluation report number from the I.C.B.O Evaluation Service, Inc. verifying its allowable loads.
2. Mason Industries, Inc. type SAS.

N. Specification Type "U"
1. Vibration isolation manufacturer shall furnish rectangular steel concrete pouring forms for floating and inertia foundations. Bases for split case pumps shall be large enough to provide for suction and discharge elbows. Bases shall be a minimum of 1/12 of the longest dimension of the base but not less than 6" (150mm). The base depth need not exceed 12" (300mm) unless specifically recommended by the base manufacturer for mass or rigidity. Forms shall include minimum concrete reinforcing consisting of 1/2" (12mm) bars welded in place on 6" (150mm) centers running both ways in a layer 1 ½" (38mm) above the bottom. Forms shall be furnished with steel templates to hold the anchor bolts sleeves and anchors while concrete is being poured. Height saving brackets shall be employed in all mounting locations to maintain a 1" (25mm) clearance below the base. Wooden formed bases leaving a concrete rather then a steel finish are not acceptable.
2. Mason Industries, Inc. type BMK or K.

O. Specification Type "W"
1. Flexible spherical expansion joints shall employ peroxide cured EPDM in the covers, liners and Kevlar® tire cord frictioning. Any substitutions must have equal or superior physical and chemical characteristics. Solid steel rings shall be used within the raised face rubber flanged ends to prevent pullout. Flexible cable bead wire is not acceptable. Sizes 2" (50mm) and larger shall have two spheres reinforced with a ductile iron external ring between spheres. Flanges shall be split ductile iron or steel with hooked or similar interlocks. Sizes 16"(400mm) to 24" (600mm) may be single sphere. Sizes ¾" (19mm) to 1½" (38mm) may have threaded two piece bolted flange assemblies, one sphere and cable retention. Connectors shall be rated at 250 psi (1.72MPa) up to 170F (77C) with a uniform drop in allowable pressure to 215 psi (1.48MPa) at 250F (121C) in sizes through 14" (350mm). 16" (400mm) through 24" (600mm) single sphere minimum ratings are 180 psi (1.24MPa) at 170F (77C) and 150 psi (1.03MPa) at 250F

(121C). Higher rated connectors may be used to accommodate service conditions. All expansion joints must be factory tested to 150% of rated pressure for 12 minutes before shipment. Safety factors to burst and flange pullout shall be a minimum of 3/1. Concentric reducers to the above ratings may be substituted for equal ended expansion joints.

a. Expansion joints shall be installed in piping gaps equal to the length of the expansion joints under pressure. Control rods need only be used in unanchored piping locations where the manufacturer determines the installation exceeds the pressure requirement without control rods. If control rods are used, they must have ½" (12mm) thick Neoprene washer bushings large enough in diameter to take the thrust at 1000 psi (.7 kg/mm2) maximum on the washer area.
b. Submittals shall include two test reports by independent consultants showing minimum reductions of 20 DB in vibration accelerations and 10 DB in sound pressure levels at typical blade passage frequencies on this or a similar product by the same manufacturer. All expansion joints shall be installed on the equipment side of the shut off valves.

2. Mason Industries, Inc. type SAFEFLEX SFDEJ, SFEJ, SFDCR or SFU and Control Rods CR.

P. Specification Type "X"

1. Flexible stainless steel hose shall have stainless steel braid and carbon steel fittings. Sizes 3" (75mm) and larger shall be flanged. Smaller sizes shall have male nipples. Minimum lengths shall be as tabulated:
   a. Flanged
      1) 3" x 14" (75 x 350mm)
      2) 6" x 20" (150 x 500mm)
      3) 12" x 28" (300 x 700mm)
      4) 4" x 15" (100 x 375mm)
      5) 8" x 22" (200 x 550mm)
      6) 14" x 30" (350 x 750mm)
      7) 5" x 19" (125 x 475mm)
      8) 10" x 26" (250 x 650mm)
      9) 16" x 32" (400 x 800mm)
   b. Male Nipples
      1) 1/2" x 9" (12 x 225mm)
      2) 1 1/4" x 12" (32 x 300mm)
      3) 2" x 14" (50 x 350mm)
      4) 3/4" x 10" (19 x 250mm)
      5) 1 1/2" x 13" (38 x 325mm)
      6) 2 1/2" x 18" (64 x 450mm)
      7) 1" x 11" (25 x 275mm)
   c. Hoses shall be installed on the equipment side of the shut-off valves horizontally and parallel to the equipment shafts wherever possible.
2. Mason Industries, Inc. type BSS.

2.03 VIBRATION ISOLATION OF PIPING

A. Horizontal pipe isolation:

1. The first four pipe hangers in the main lines near the mechanical equipment shall be as described in specification K. Brace hanger rods with SRC clamps specification N.
2. Horizontal runs in all other locations throughout the building shall be isolated by hangers as described in specification J & JA.
3. Floor supported piping shall rest on isolators as described in specification F.
4. Piping connected to equipment located in basements and hangs from ceilings under occupied spaces the first three hangers shall have:
   a. 0.75" (19mm) deflection for pipe sizes up to and including 3" (75mm).
   b. 1 1/2" (38mm) deflection for pipe sizes up to and including 6" (150mm).
   c. 2 1/2" (64mm) deflection thereafter.
   d. Hangers shall be located as close to the overhead structure as practical. Hanger locations that also have seismic restraints attached must have type RW Rebound Washers to limit uplift.

2.04 SEISMIC DESIGN

A. General
   1. Specifications and plans shall indicate minimum requirements and general intent. The actual requirements shall be determined by the seismic system designer but those requirements shall not be less than indicated on the plans and in these specifications.
   2. Calculations shall be submitted and signed by a licensed professional engineer in the state where the project is located.
   3. This project is subject to the seismic bracing requirements of the International Building Code, 2009 edition. The following criteria are applicable to this project.
      a. Seismic Use Group (Table 1604.5): III
      b. Site Class Category (Table 1613.5.2): D
      c. Seismic Design Category: C
   4. The following component importance factors (Ip) shall be used on non-structural mechanical components unless specified elsewhere. The seismic system designer shall verify all importance factors and project conditions prior to submitting calculations.
      a. Hydronic Piping: Ip=1.0
      b. Chiller: Ip=1.0
      c. Pump: Ip=0

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 GENERAL

A. All vibration isolators and seismic restraint systems must be installed in strict accordance with the manufacturers written instructions and all certified submittal data.

B. Installation of vibration isolators and seismic restraints must not cause any change of position of equipment, piping resulting in stresses or misalignment.

C. No rigid connections between equipment and the building structure shall be made that degrades the noise and vibration control system herein specified.

D. The contractor shall not install any equipment, piping, duct or conduit which makes rigid connections with the building unless isolation is not specified. “Building” includes, but is not limited to, slabs, beams, columns, studs and walls.

E. Coordinate work with other trades to avoid rigid contact with the building.

F. Any conflicts with other trades which will result in rigid contact with equipment or piping due to inadequate space or other unforeseen conditions should be brought to the architects/engineers attention prior to installation. Corrective work necessitated by conflicts after installation shall be at the responsible contractors expense.

G. Bring to the architects/engineers attention any discrepancies between the specifications and the field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the responsible contractors expense.

H. Correct, at no additional cost, all installations which are deemed defective in workmanship and materials at the contractors expense.

I. Overstressing of the building structure must not occur because of overhead support of equipment. Contractor must submit loads to the structural engineer of record for approval. Generally bracing may occur from:
   1. Flanges of structural beams.
   2. Upper truss cords in bar joist construction.
   3. Cast in place inserts or wedge type drill-in concrete anchors.

J. Specification L cable restraints shall be installed slightly slack to avoid short circuiting the isolated suspended equipment, piping or conduit.

K. Specification L cable assemblies are installed taut on non-isolated systems. Specification M seismic solid braces may be used in place of cables on rigidly attached systems only.

L. At locations where specification L or M restraints are located, the support rods must be braced when necessary to accept compressive loads with specification N braces.

M. At locations where specification L cable restraints are installed on support rods with spring isolators, the spring isolation hangers must be specification type JA.

N. At all locations where specification L or M restraints are attached to pipe clevis, the clevis cross bolt must be reinforced with specification type O braces.

O. Drill-in concrete anchors for ceiling and wall installation shall be specification type R, and specification type S female wedge type for floor mounted equipment.

P. Locate isolation hangers as near to the overhead support structure as possible.

Q. All mechanical equipment shall be vibration isolated and seismically restrained as per the schedules in the drawings.

3.03 SEISMIC CERTIFICATION AND ANALYSIS:

A. Seismic restraint calculations must be provided for all connections of equipment to the structure. Calculations must be stamped by a registered professional engineer licensed in the

state of the job location.

B. Calculations (including the combining of tensile and shear loadings) to support seismic restraint designs must be stamped by a registered professional engineer licensed in the state of the job location. Testing and calculations must include both shear and tensile loads as well as one test or analysis at 45 to the weakest mode.

C. Analysis must indicate calculated dead loads, static seismic loads and capacity of materials utilized for connections to equipment and structure. Analysis must detail anchoring methods, bolt diameter, embedment and/or welded length. All seismic restraint devices shall be designed to accept, without failure.

3.04 FIELD QUALITY CONTROL

A. Inspect isolated equipment after installation and submit report. Include static deflections.

3.05 SCHEDULE

A. Pipe Isolation Schedule.
1. 1 Inch Pipe Size: Isolate 120 diameters from equipment.
2. 2 Inch Pipe Size: Isolate 90 diameters from equipment.
3. 3 Inch Pipe Size: Isolate 80 diameters from equipment.
4. 4 Inch Pipe Size: Isolate 75 diameters from equipment.
5. 5 Inch Pipe Size: Isolate 60 diameters from equipment.
6. 6 Inch Pipe Size: Isolate 60 diameters from equipment.
7. 8 Inch Pipe Size: Isolate 60 diameters from equipment.

B. Equipment Isolation Schedule.
1. HVAC Pumps.
   a. Base: Concrete inertia base.
   b. Isolator Specification Type: E, P, U, and W
   c. Isolator Deflection: 0.75 inches.
2. Centrifugal Water Chillers.
   a. Isolator Specification Type: W

END OF SECTION

SECTION 15075 - MECHANICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe Markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers; 2007.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

F. Project Record Documents: Record actual locations of tagged valves.

G. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Spare parts lists
   2. Shop drawings and product data

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Control Panels: Nameplates.

B. Major Control Components: Nameplates.

C. Chiller: Nameplates

D. Piping: Pipe markers.

E. Pumps: Nameplates.

F. Small-sized Equipment: Tags.

G. Thermostats: Nameplates.

H. Valves: Tags.

I. Water Treatment Devices: Nameplates.

2.02 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.

B. Champion America, Inc: www.Champion-America.com.

C. Seton Identification Products: www.seton.com/aec.

2.03 NAMEPLATES

A. Manufacturers:

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.

2.04 TAGS

A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

B. Chart: Typewritten letter size list in anodized aluminum frame.

2.05 PIPE MARKERS

A. Manufacturers:

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Identify control panels and major control components outside panels with plastic nameplates.

E. Identify valves in main and branch piping with tags.

F. Tag automatic controls, instruments, and relays. Key to control schematic.

G. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight

runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 15080 - MECHANICAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Equipment insulation.

C. Insulation jackets.

D. Jackets and accessories.

1.02 SCOPE OF WORK:

A. Provide insulation as specified for make-up water and chilled water piping systems, including valves, fittings, flanges, strainers, and mechanical couplings.

1.03 RELATED SECTIONS

A. Section 15075 - Mechanical Identification.

1.04 REFERENCES

A. ASTM C 553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 1992.

B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1996a.

C. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; 1995.

D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; 1993.

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Shop drawings and product data

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.07 REGULATORY REQUIREMENTS

A. Materials: Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E 84.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 PIPE INSULATION

A. Insulation shall have composite (insulation jacket or facing, and adhesive used to adhere the facing or jacket to the insulation) fire and smoke hazard ratings as tested by procedure ASTM E84, NFPA 255 or UL 723 not exceeding:
   1. Flame Spread: 25.
   2. Smoke Developed: 50.

B. Insulation shall be glass fiber with a maximum K factor of .24 at 75 degrees F mean temperature with factory applied fire resistant vapor barrier jacket, for cold piping and fire retardant jacket for hot water.
   1. For fittings and valve bodies 3" and smaller, insulation shall be one-pound density glass fiber blanket wrapped firmly under compression with No. 20 gauge galvanized annealed steel wire and given a smoothing coat of finishing cement.

C. Accessories such as adhesives, mastics, cements, tapes and cloth for fittings shall have the same component rating as listed above. All products or their shipping cartons shall bear a label indicating that flame and smoke ratings do not exceed requirements. Treatment of jackets or facings to impart flame and smoke-safety shall be permanent. The use of water-soluble treatments are prohibited.
   1. Where Benjamin-Foster adhesives are specified equal products manufactured by 3M Company, or the manufacturer of the insulation are acceptable upon approval by the Engineer. Armstrong 520 adhesive shall be used for Armstrong insulation.
   2. In lieu of longitudinal lap seam specified, self-sealing lapped jacket shall be acceptable with requirement for aluminum bands on concealed piping.

D. GLASS FIBER
   1. Manufacturers.
      a. Provide products complying with the specifications by one of the following manufactures.
         1) Certain Teed Corporation.
         2) Johns Manville
         3) Knauf Fiberglass GmbH.
         4) Owens-Corning Fiberglass Corporation.
   2. Insulation: ASTM C 795; semi-rigid, noncombustible, end grain adhered to jacket.
      a. 'K' value: ASTM C 177, 0.24 at 75 degrees F.

b. Maximum service temperature: 650 degrees F.
c. Maximum moisture absorption: 0.2 percent by volume.

3. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E 96 of 0.02 perm-inches.
4. Vapor Barrier Lap Adhesive:
   a. Compatible with insulation.
5. Insulating Cement/Mastic:
   a. ASTM C 195; hydraulic setting on mineral wool.
6. Fibrous Glass Fabric:
   a. Cloth: Untreated; 9 oz/sq yd weight.
   b. Blanket: 1.0 lb/cu ft density.
   c. Weave: 5x5.

E. JACKETS
1. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
   a. Lagging Adhesive:
      1) Compatible with insulation.

2.02 EQUIPMENT INSULATION

A. Insulation for chilled water pumps shall be 6# per cubic foot density glass fiber with fire retardant vapor barrier facing and having a maximum K factor of 0.24 at 75 degrees F mean temperature.

B. Sections of equipment requiring periodic servicing shall be insulated with removable ArmourCote covers as manufactured by Insulcoustic Corporation or by Sheet Metal Casings with insulation applied to be interior surface of the casing.

C. Air elimination devices for chilled systems shall be insulated with foamed plastic sheet insulation, 1/2" thickness, applied with approved adhesives in strict accordance with manufacturer's recommendations, and finished with two (2) coats of Armstrong Insulcolor paint, color as directed.

D. GLASS FIBER, FLEXIBLE
1. Manufacturers.
   a. Provide products complying with the specifications by one of the following manufactures.
      1) Certain Teed Corporation.
      2) Johns Manville
      3) Knauf Fiberglass GmbH.
      4) Owens-Corning Fiberglass Corporation.
2. Insulation: ASTM C 553; flexible, noncombustible.
   a. 'K' Value: ASTM C 177 or ASTM C 518, 0.24 at 75 degrees F.
   b. Maximum Service Temperature: 250 degrees F.
   c. Maximum Moisture Absorption: 0.2 percent by volume.
   d. Density: 1.0 lb/cu ft.
3. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to

aluminized film.
a. Moisture vapor transmission: ASTM E 96; 0.02 perm.
b. Secure with self-sealing longitudinal laps and butt strips.
c. Secure with outward clinch expanding staples and vapor barrier mastic.

4. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
5. Vapor Barrier Lap Adhesive:
   a. Compatible with insulation.

E. JACKETS
1. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that equipment has been tested before applying insulation materials.

C. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. PIPE INSULATION
1. Longitudinal lap and 4" wide vapor barrier joint seal strips shall be adhered neatly in place with BF 85-20 adhesive or approved equal and banded.
2. The ends of pipe insulation shall be sealed off with BF 30-35 coatings at all flanges, valves and fittings and at intervals of not more than 21 feet on continuous runs or pipes.
3. Fittings shall be vapor sealed by applying a layer of white open weave glass fabric (20 x 20 between two 1/16" thick coats of BF 30-35.
4. Insulation shall be fastened in place with 16 gauge annealed wire on 18" centers maximum for piping runs and as required for a secure installation at fittings, valves, and appurtenances. Provide 8 ounce canvas jacket pasted in place and sized for all exposed piping.
5. Exposed piping shall receive 8 ounce canvas jacket.
6. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
7. Glass fiber insulated pipes conveying fluids below ambient temperature:
   a. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   b. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
8. Inserts and Shields:

a. Application: Piping 1-1/2 inches diameter or larger.
b. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
c. Insert location: Between support shield and piping and under the finish jacket.
d. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
e. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

9. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07840.
10. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

D. EQUIPMENT INSULATION
1. Insulation shall be firmly held in place with galvanized steel wire or galvanized steel bands on 12" centers.
2. All joints and voids in the insulation shall be filled with insulating and finishing cement. All joints and breaks in the vapor barrier shall be sealed strips of the vapor barrier facing adhered with Benjamin-Foster 85-20 adhesive.
3. Finish shall consist of imbedding an open weave glass fabric (20 x 20) into wet coating of Benjamin-Foster's 30-36 overlapping the seams at least two inches. A finished coat of BF 20-26 shall then be applied.
4. Factory Insulated Equipment: Do not insulate.
5. Exposed Equipment: Locate insulation and cover seams in least visible locations.
6. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
7. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
8. Insulated equipment containing fluids below ambient temperature: Insulate entire system.
9. Fiber glass insulated equipment containing fluids below ambient temperature: Provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.
10. Inserts and Shields:
a. Application: Equipment 1-1/2 inches diameter or larger.
b. Shields: Galvanized steel between hangers and inserts.
c. Insert location: Between support shield and equipment and under the finish jacket.
d. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
e. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
11. Finish insulation at supports, protrusions, and interruptions.
12. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.
13. Exterior Applications: Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal equipment.

14. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement aluminum jacket.
15. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
16. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.03 SCHEDULES

A. PIPING INSULATION
   1. Make-up water piping:
      a. All pipe sizes: 1-inch Glass fiber insulation.
   2. Chilled water supply and return piping:
      a. All pipe sizes: 1-1/2 inch Glass fiber insulation.

B. EQUIPMENT INSULATION
   1. Cooling Systems:
      a. Pump Bodies:
         1) Glass Fiber, Flexible Insulation: 1.5 Inches Thick.

END OF SECTION

SECTION 15128 - GAGES AND METERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gages and pressure gage taps.

B. Thermometers and thermometer wells.

1.02 RELATED REQUIREMENTS

A. Section 15182 - Hydronic Piping.

B. Section 15926 - Digital Control Equipment.

C. Section 15940 - HVAC Sequence of Operation.

1.03 REFERENCE STANDARDS

A. ASME B40.100 - Pressure Gauges and Gauge Attachments; The American Society of Mechanical Engineers; 2005.

B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers; 2007.

C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers; 2007.

D. UL 393 - Indicating Pressure Gauges for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01600 - Product Requirements. for additional provisions.

D. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Local representative
   2. Recommended spare parts
   3. Spare parts lists
   4. Operating instructions
   5. Maintenance instructions, including preventative and corrective maintenance.
   6. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   7. Copies of warranties

1.05 FIELD CONDITIONS

A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAGES

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Moeller Instrument Co., Inc: www.moellerinstrument.com.
   3. Omega Engineering, Inc: www.omega.com.
   4. Weiss
   5. Substitutions: See Section 01600 - Product Requirements.

B. Pressure Gages: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
   1. Case: Steel with brass bourdon tube.
   2. Size: 4-1/2 inch diameter.
   3. Mid-Scale Accuracy: One percent.
   4. Scale: Psi.

2.02 PRESSURE GAGE TAPPINGS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 STEM TYPE THERMOMETERS

A. Manufacturers:
   1. Dwyer Instruments, Inc: www.dwyer-inst.com.
   2. Omega Engineering, Inc: www.omega.com.
   3. Weiss
   4. Weksler Glass Thermometer Corp: www.wekslerglass.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
   1. Size: 9 inch scale.
   2. Window: Clear Lexan.
   3. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

2.04 THERMOMETER SUPPORTS

A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide one pressure gage per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gage.

C. Install pressure gages with pulsation dampers. Provide gage cock to isolate each gage. Extend nipples and siphons to allow clearance from insulation.

D. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.

E. Coil and conceal excess capillary on remote element instruments.

F. Provide instruments with scale ranges selected according to service with largest appropriate scale.

G. Install gages and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

H. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate to zero.

I. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION

SECTION 15182 - HYDRONIC PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and pipe fittings for:
   1. Chilled water piping system.
   2. Equipment drains and overflows.

B. Valves:
   1. Gate valves.
   2. Butterfly valves.
   3. Check valves.

1.02 RELATED REQUIREMENTS

A. Section 09900 - Paints and Coatings.

B. Section 15075 - Mechanical Identification.

C. Section 15073 - Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Section 15183 - Hydronic Specialties.

E. Section 15189 - Chemical Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers; 2010.

B. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers; 1998 (R2006).

C. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers; 2008 (ANSI/ASME B31.9).

D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2010.

E. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2011.

F. AWWA C606 - Grooved and Shouldered Joints.

G. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

1.04 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.

C. Use non-conducting dielectric connections whenever jointing dissimilar metals.

D. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.

E. Use lug end butterfly valves to isolate equipment.

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Welders Certificate: Include welders certification of compliance with ASME (BPV IX).

D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

E. Project Record Documents: Record actual locations of valves.

F. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

G. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
1. Recommended spare parts
2. Spare parts lists
3. Maintenance instructions, including preventative and corrective maintenance
4. Shop drawings and product data

1.06 QUALITY ASSURANCE

A. Welder Qualifications: Certify in accordance with ASME (BPV IX).

1.07 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of piping system.

B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.

C. Provide certificate of compliance from authority having jurisdiction, indicating approval of welders.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until

installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers and supports as required, as indicated, and as follows:
1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
3. Provide pipe hangers and supports in accordance with ASME B31.9 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or unions to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

D. Valves: Provide valves where indicated and as follows:
1. Provide drain valves where indicated, and if not indicated provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
3. For throttling, bypass, or manual flow control services, use butterfly valves.
4. For shut-off and to isolate parts of systems or vertical risers, use butterfly valves.

E. Welding Materials and Procedures: Conform to ASME (BPV IX).

2.02 CHILLED WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:
1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1 welded.
2. Threaded Joints: ASTM B16.3, malleable iron fittings.
3. Fittings: ASTM A 234/A 234M, wrought steel; ASTM A 395 and A 536, ductile iron; or ASTM A 53, (fabricated from carbon steel pipe), grooved end or welding type

2.03 Fittings: ASTM A 234/A 234M, wrought steel; ASTM A 395 and A 536, ductile iron; or ASTM A 53, (fabricated from carbon steel pipe), welding type

2.04 EQUIPMENT DRAINS

A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.

2. Joints: Threaded.

2.05 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.

B. Conform to ASME B31.9.

C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded spacers and hanger rods, cast iron roll.

2.06 UNIONS, FLANGES, AND COUPLINGS

A. Unions for Pipe 2 Inches and Under:
   1. Ferrous Piping: 150 psig malleable iron, threaded, or type 304/304L stainless steel, threaded type, with Vic Press 304™ ends.

B. Flanges for Pipe Over 2 Inches:

C. Ferrous Piping: 150 psig forged steel, slip-on.
   1. Gaskets: 1/16 inch thick preformed neoprene.

D. Dielectric Connections: Union or waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint types used.

2.07 GATE VALVES

A. Manufacturers:
   1. Conbraco Industries: www.conbraco.com.
   2. Nibco, Inc: www.nibco.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Up To and Including 2 Inches:
   1. Bronze body, bronze trim, screwed bonnet, non-rising stem, lockshield stem, inside screw with backseating stem, solid wedge disc, alloy seat rings, solder ends.

C. Over 2 Inches:
   1. Iron body, bronze trim, bolted bonnet, rising stem, handwheel, outside screw and yoke, solid wedge disc with bronze seat rings, flanged ends.

2.08 BUTTERFLY VALVES

A. Manufacturers:
   1. Hammond Valve: www.hammondvalve.com.
   2. Crane Co.: www.cranevalve.com.
   3. Milwaukee Valve Company: www.milwaukeevalve.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer or lug ends, extended neck.

C. Disc: Aluminum bronze.

D. Operator: 10 position lever handle.

2.09 SPRING LOADED CHECK VALVES

A. Manufacturers:
1. Hammond Valve: www.hammondvalve.com.
2. Crane Co.: www.cranevalve.com.
3. Milwaukee Valve Company: www.milwaukeevalve.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Iron body, bronze trim, split plate, hinged with stainless steel spring, resilient seal bonded to body, wafer or threaded lug ends.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with couplings, flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. Refer to Section 15189 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install piping to conserve building space and to avoid interfere with use of space.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors.

E. Slope piping and arrange to drain at low points.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

H. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.

2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

I. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 15080.

J. Provide access where valves and fittings are not exposed.

K. Use eccentric reducers to maintain top of pipe level.

L. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting.

M. Install valves with stems upright or horizontal, not inverted.

3.03 SCHEDULES

A. Hanger Spacing for Steel Piping.
1. 1/2 inch, 3/4 inch, and 1 inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
2. 1-1/4 inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
3. 1-1/2 inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
4. 2 inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
5. 2-1/2 inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.
8. 5 inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.
9. 6 inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.
10. 8 inches: Maximum span, 12 feet; minimum rod size, 5/8 inch.

END OF SECTION

SECTION 15183 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air vents.

B. Air separators.

C. Strainers.

D. Pump suction fittings.

1.02 RELATED REQUIREMENTS

A. Section 15182 - Hydronic Piping.

B. Section 15189 - Chemical Water Treatment: Pipe Cleaning.

1.03 REFERENCE STANDARDS

A. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
1. Recommended spare parts
2. Spare parts lists
3. Operating instructions
4. Maintenance instructions, including preventative and corrective maintenance.
5. Copies of warranties
6. Wiring diagrams
7. Inspection procedures
8. Shop drawings and product data

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.01 AIR VENTS

A. Manufacturers:

1. Armstrong International, Inc: www.armstronginternational.com.
2. ITT Bell & Gossett: www.bellgossett.com.
3. Taco, Inc: www.taco-hvac.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C. Float Type:
1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.02 AIR SEPARATORS

A. Combination Air Separators/Strainers:
1. Manufacturers:
a. Armstrong International, Inc: www.armstronginternational.com.
b. ITT Bell & Gossett: www.bellgossett.com.
c. Taco, Inc: www.taco-hvac.com.
d. Substitutions: See Section 01600 - Product Requirements.
2. Steel, tested and stamped in accordance with ASME (BPV VIII, 1); for 125 psi operating pressure, with integral bronze strainer, tangential inlet and outlet connections, and internal stainless steel air collector tube.

2.03 STRAINERS

A. Manufacturers:
1. Armstrong International, Inc: www.armstronginternational.com.
2. Green Country Filtration: greencountryfiltration.com.
3. WEAMCO: www.weamco.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Size 2 inch and Under:
1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.

C. Size 2-1/2 inch to 4 inch:
1. Flanged iron body for 175 psi working pressure, Y pattern with 3/64 inch stainless steel perforated screen.

D. Size 5 inch and Larger:
1. Flanged iron body for 175 psi working pressure, basket pattern with 1/8 inch stainless steel perforated screen.

2.04 SUCTION DIFFUSERS

A. Manufacturers:
1. ITT Bell & Gossett: www.bellgossett.com.
2. Anvil International, Inc: www.anvilintl.com.

3. Victaulic Company of America: www.victaulic.com.
4. Substitutions: See Section 01600 - Product Requirements.

B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable fine mesh strainer to fit over cylinder strainer, and permanent magnet located in flow stream and removable for cleaning.

C. Accessories: Adjustable foot support, blowdown tapping in bottom, gage tapping in side.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install specialties in accordance with manufacturer's instructions.

B. Where large air quantities can accumulate, provide enlarged air collection standpipes.

C. Provide manual air vents at system high points and as indicated.

D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.

E. Provide valved drain and hose connection on strainer blow down connection.

F. Provide pump suction fitting on suction side of base mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.

G. Support pump fittings with floor mounted pipe and flange supports.

END OF SECTION

SECTION 15188 - HVAC PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Base mounted pumps.

1.02 RELATED REQUIREMENTS

A. Section 03300 - Cast-in-Place Concrete.

B. Section 15182 - Hydronic Piping.

C. Section 15183 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 778 - Standard for Motor-Operated Water Pumps; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. See Section 01300 - Administrative Requirements, for submittal procedures.

C. Millwright's Certificate: Certify that base mounted pumps have been aligned.

D. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Local representative
   2. Safety instructions
   3. Recommended spare parts
   4. Spare parts lists
   5. Operating instructions
   6. Maintenance instructions, including preventative and corrective maintenance.
   7. Copies of warranties
   8. Wiring diagrams
   9. Inspection procedures
   10. Shop drawings and product data

PART 2 PRODUCTS (FOR REFERENCE ONLY. EQUIPMENT PROVIDED BY OWNER.)

2.01 MANUFACTURERS

A. Armstrong Pumps Inc: www.armstrongpumps.com.

B. ITT Bell & Gossett: www.bellgossett.com.

C. TACO

2.02 HVAC PUMPS - GENERAL

A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Base Mounted Pumps: Aligned by laser.

C. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to authority having jurisdiction as suitable for the purpose specified and indicated.

2.03 BASE MOUNTED PUMPS

A. Type: Horizontal shaft, single stage, direct connected, radially or horizontally split casing, for 125 psi maximum working pressure.

B. Casing: Cast iron, with suction and discharge gage ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.

C. Impeller: Bronze, fully enclosed, keyed to shaft.

D. Bearings: Oil lubricated roller or ball bearings.

E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.

F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.

G. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 250 degrees F maximum continuous operating temperature.

H. Drive: Flexible coupling with coupling guard.

I. Baseplate: Cast iron or fabricated steel with integral drain rim.

J. Electrical Characteristics:
   1. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.

C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close coupled or base mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over. Refer to Section 15073.

D. Provide line sized shut-off valve and strainer on pump suction, and line sized soft seat check valve and balancing valve on pump discharge.

E. Provide air cock and drain connection on horizontal pump casings.

F. Provide drains for bases and seals, piped to and discharging into floor drains.

G. Check, align, and certify alignment of base mounted pumps prior to start-up.

H. Grout base as per manufacturers instructions

I. Install close coupled and base mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place.

J. Lubricate pumps before start-up.

END OF SECTION

SECTION 15189 - CHEMICAL WATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cleaning of piping systems.

B. Chemical feeder equipment.

C. Chemical treatment.

1.02 RELATED REQUIREMENTS

A. Section 15182 - Hydronic Piping.

B. Section 15183 - Hydronic Specialties.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
1. Local representative
2. Emergency instructions
3. Safety instructions
4. Recommended spare parts
5. Spare parts lists
6. Operating instructions
7. Maintenance instructions, including preventative and corrective maintenance.
8. Copies of warranties
9. Wiring diagrams
10. Shop drawings and product data

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems and to public sewage systems.

B. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. AmSolv/Division of Amrep, Inc: www.amsolv.com.

B. GE Water Technologies: www.gewater.com.

C. Nalco Company: www.nalco.com.

D. United

2.02 MATERIALS

A. System Cleaner:
   1. Manufacturers:
      a. AmSolv/Division of Amrep, Inc: www.amsolv.com.
      b. GE Water Technologies: www.gewater.com.
      c. Nalco Company: www.nalco.com.
      d. Substitutions: See Section 01600 - Product Requirements.
   2. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodium tripoly phosphate and sodium molybdate.

B. Closed System Treatment (Water):
   1. Manufacturers:
      a. AmSolv/Division of Amrep, Inc: www.amsolv.com.
      b. GE Water Technologies: www.gewater.com.
      c. Nalco Company: www.nalco.com.
      d. Substitutions: See Section 01600 - Product Requirements.
   2. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
   3. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
   4. Conductivity enhancers; phosphates or phosphonates.

2.03 BY-PASS (POT) FEEDER

A. Manufacturers:
   1. Griswold Controls: www.griswoldcontrols.com.
   2. J. L. Wingert Company: www.jlwingert.com.
   3. Neptune Chemical Pump Company: www.neptune1.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Two quart quick opening cap for working pressure of 175 psi.

PART 3 EXECUTION

3.01 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. Place terminal control valves in open position during cleaning.

C. Verify that electric power is available and of the correct characteristics.

3.02 CLEANING SEQUENCE

A. Concentration:
   1. As recommended by manufacturer.

B. Chilled Water Systems:
   1. Circulate for 48 hours, then drain systems as quickly as possible.
   2. Refill with clean water, circulate for 24 hours, then drain.
   3. Refill with clean water and repeat until system cleaner is removed.

C. Remove, clean, and replace strainer screens.

D. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 CLOSED SYSTEM TREATMENT

A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.

B. Introduce closed system treatment through bypass feeder when required or indicated by test.

C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.

3.05 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
   1. Provide minimum of two hours of instruction for two people.
   2. Have operation and maintenance data prepared and available for review during training.
   3. Conduct training using actual equipment after treated system has been put into full operation.

END OF SECTION

SECTION 15623 - CENTRIFUGAL WATER CHILLERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Chiller package.

B. Charge of refrigerant and oil.

C. Controls and control connections.

D. Chilled water connections.

E. Condenser water connections.

F. Variable speed drives.

G. Starters.

H. Electrical power connections.

I. Refrigerant Monitor

1.02 RELATED REQUIREMENTS

A. Section 15073 - Vibration and Seismic Controls for HVAC Piping and Equipment.

B. Section 15076 - Identification for HVAC Piping and Equipment.

C. Section 15950 - Testing, Adjusting, and Balancing.

D. Section 16155 - Equipment Wiring.

1.03 SUBMITTALS

A. Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.

B. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate equipment, piping and connections, valves, strainers, and thermostatic valves required for complete system.

C. Manufacturer's Certificate: Certify that components of package not furnished by manufacturer have been selected in accordance with manufacturer's requirements.

D. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

E. Operation and Maintenance Manuals: Include in manuals the information listed below. For information on how to prepare and submit manuals see section 1780 (Closeout Submittals).
   1. Recommended spare parts
   2. Spare parts lists
   3. Operating instructions
   4. Maintenance instructions, including preventative and corrective maintenance.
   5. Copies of warranties
   6. Wiring diagrams

7. Shop drawings and product data

1.04 WARRANTY

A. The chiller manufacturer's warranty shall cover parts and labor costs for the repair or replacement of defects in material or workmanship for a period of one year from equipment startup or 18 months from shipment, whichever occurs first. Warranty support shall be provided by company direct or factory authorized service permanently located near the job site.

PART 2 PRODUCTS (FOR REFERENCE ONLY. EQUIPMENT PROVIDED BY OWNER.)

2.01 MANUFACTURERS

A. Daiken/ McQuay International: http://www.mcquay.com.

B. Smardt: http://www.smardt.com/

2.02 UNIT DESCRIPTION

A. Provide and install as shown on the plans a factory assembled, charged, and tested water-cooled packaged centrifugal chiller. Chillers shall have no more than two oil-free, magnetic bearing, semi-hermetic centrifugal compressors (no exceptions). Each compressor shall have an integrated variable-frequency drive operating in concert with inlet guide vanes for optimized full and part load efficiency. On two compressor units, the evaporator and condenser refrigerant sides and the expansion valve shall be common and the chiller shall be capable of running on one compressor with the other compressor or any of its auxiliaries inoperable or removed.

B. Each chiller shall be factory run-tested under load conditions for a minimum of one hour on an AHRI qualified test stand with evaporator and condenser water flow at job conditions (excluding glycol applications). Operating controls shall be adjusted and checked. The refrigerant charge shall be adjusted for optimum operation and recorded on the unit nameplate. Any deviation in performance or operation shall be remedied prior to shipment and the unit retested if necessary to confirm repairs or adjustments. Manufacturer shall supply a certificate of completion of a successful run-test upon request.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete water-cooled, semi-hermetic oil-free centrifugal compressor water chiller as specified herein. In general, unit shall consist of one or two magnetic bearing, completely oil-free centrifugal compressors, refrigerant, condenser and evaporator, and control systems including integrated variable frequency drive, operating controls and equipment protection controls. Chillers shall be designed to operate within an ambient temperature range of 20ºF to 130ºF with a maximum humidity of 95% (non-condensing) and shall be charged with refrigerant HFC-134a. If manufacturer offers a chiller using any HCFC refrigerant that is subject to phase out by the Montreal Protocol or the U.S. Clean Air Act, manufacturer shall provide, in writing, documentation signed by an officer of the company assuring refrigerant availability and price schedule for a 20-year period.

B. The entire chiller system, including all pressure vessels, shall remain above atmospheric pressure during all operating conditions and during shut down to ensure that

non-condensables and moisture do not contaminate the refrigerant and chiller system. If any portion of the chiller system is below atmospheric pressure during either operation or shut down, the manufacturer shall include, at no charge:

1. Purge System
    a. A complete purge system capable of removing non-condensables and moisture during operation and shut-down. The system shall consist of an air cooled condensing unit, purge condensing tank, pumpout compressor, and control system.
    b. A dedicated condensing unit shall be provided with the purge system to provide a cooling source whether or not the chiller is running. The condensing unit shall provide a low purge coil temperature to result in a maximum loss of 0.1 pounds of refrigerant per pound of purged air.
    c. The purge system shall be connected to a 100% reclaim device.
    d. A 20-year purge maintenance agreement that provides parts, labor, and all preventative maintenance required by the manufacturer's operating and maintenance instructions.
2. Annual Oil/Refrigerant Analysis
    a. The manufacturer shall also include at no charge for a period of 20 years an annual oil and refrigerant analysis report to identify chiller contamination due to vacuum leaks. If the analysis identifies water, acid, or other contaminant levels higher than specified by the manufacturer, the oil and/or refrigerant must be replaced or returned to the manufacturer's original specification at no cost to the owner.
3. Shell Pressurization System
    a. The manufacturer shall include a factory-installed and wired system that will enable service personnel to readily elevate the vessel pressure during shutdown to facilitate leak testing.
    b. A factory mounted, wired, and installed shell pressurization system shall be provided to keep air out of the chiller when the unit is not in service. Electric blanket or hot water circulation system are both acceptable.
4. Performance: Refer to chiller performance rating.

2.04 CHILLER COMPONENTS

A. Compressors:
    1. The unit shall utilize magnetic bearing, oil-free, semi-hermetic centrifugal compressors. The levitated shaft position shall be digitally controlled and shall be monitored by X-axis position sensor, Y-axis position sensor, and Z-axis position sensor. The compressor drive train shall be capable of coming to a controlled, safe stop in the event of a power failure by diverting stored power to the magnetic bearing controls system.
    2. The motor shall be of the semi-hermetic type, of sufficient size to efficiently fulfill compressor horsepower requirements. It shall be liquid refrigerant cooled with internal thermal sensing devices in the stator windings. The motor shall be compatible with variable frequency drive operation.
    3. If unit contains an atmospheric shaft seal, the manufacturer shall provide the following at no additional charge:
        a. 20 year warranty and all preventive maintenance required to maintain the shaft seal including appropriate disposal of all oil lost through the shaft seal. Such

disposal shall be done in a manner consistent with all Federal, state, and local laws pertaining to disposal and documentation of appropriate disposal shall be provided
   b. Replacement and re-charging on a semi-annual basis, or more often if required, of all oil lost through the shaft seal
   c. 20 year refrigerant replacement warranty for any loss of refrigerant that can be directly attributable to the failure of the atmospheric shaft seal
4. If the compressor drive motor is an open design the chiller manufacturer shall provide at no additional charge a self contained air conditioning system in the mechanical space sized to handle the maximum heat output the open drive motor. The energy required to operate this air conditioning system shall be added to the chiller power at all rating points for energy evaluation purposes.
5. If the compressor drive motor uses any form of antifriction bearings (roller, ball, etc) the chiller manufacturer shall provide the following at no additional charge:
   a. A 20 year motor bearing warranty and all preventative maintenance, including lubrication, required to maintain the bearings as specified in the manufacturer's operating and maintenance instructions
   b. At start up a three axis vibration analysis and written report which establishes a baseline of motor bearing condition.
   c. An annual three axis vibration analysis and written report to indicate the trend of bearing wear.
6. The chiller shall be equipped with an integrated Variable Frequency Drive (VFD) to automatically regulate compressor speed in response to cooling load and the compressor pressure lift requirement. Movable inlet guide vanes and variable compressor speed acting together, shall provide unloading. The chiller controls shall coordinate compressor speed and guide vane position to optimize chiller efficiency.
7. Each compressor circuit shall be equipped with a line reactor to help protect against incoming power surges and help reduce harmonic distortion.
8. The unit shall have a minimum of a 0.90 power factor at compressor full load.

B. Evaporator and Condenser:
1. The evaporator and condenser shall be separate vessels of the shell-and-tube type, designed, constructed, tested and stamped according to the requirements of the ASME Code, Section VIII. Regardless of the operating pressure, the refrigerant side of each vessel will bear the ASME stamp indicating compliance with the code and indicating a test pressure of 1.1 times the working pressure, but not less than 100 psig. The tubes shall be individually replaceable and secured to the intermediate supports without rolling or expanding to facilitate replacement if required.
2. The evaporator shall be flooded type with 0.025 in wall copper internally and externally enhanced tubes rolled into carbon steel tubesheets. The water side shall be designed for a minimum of 150 psig. The refrigerant side shall be designed for a minimum of 200 psi. Provide intermediate tube supports at a maximum of 24 inch spacing. The heads shall be carbon steel. Water connections shall be flanged connections. The evaporator shall have dished heads with valved drain and vent.
3. The condenser shall have 0.025 in) wall copper internally and externally enhanced tubes rolled into carbon steel. Water connections shall be flanged. The water side shall be designed for a minimum of 150 psig. The refrigerant side shall be designed for a minimum of 200 psi. Provide intermediate tube supports at a maximum of 24 inch

spacing. The condenser shall have dished heads with valved drain and vent connections. The heads shall be carbon steel and the tubesheets shall be carbon steel.

4. Provide sufficient isolation valves and condenser volume to hold the full unit refrigerant charge the condenser at 90ºF in accordance with ANSIASHRAE 15.A during servicing or provide a separate pumpout system and storage tank sufficient to hold the charge of the largest unit being furnished.
5. An electronic expansion valve shall control refrigerant flow to the evaporator. Fixed orifice devices or float controls with hot gas bypass are not acceptable because of inefficient control at low load conditions. The liquid line shall have moisture indicating sight glass.
6. Re-seating type spring loaded pressure relief valves according to ASHRAE-15 safety code shall be furnished. The evaporator shall be provided with single or multiple valves. The condenser shall be provided with dual relief valves equipped with a transfer valve so one relief valve can be removed for testing or replacement without loss of refrigerant or removal of refrigerant from the condenser. Rupture disks are not acceptable. If rupture disks are required on negative pressure units to prevent air and moisture ingress, then factory mounted spring loaded pressure relief valves shall be provided in series with the rupture disks to contain the remaining refrigerant in the event of vessel over-pressurization. The space between the rupture disk and the relief valve shall include a suitable telltale indicator integrated into the chiller control system to alert the operator that a potential safety issue exists in the pressure relief system.
7. The evaporator, including water heads, suction line, and any other component or part of a component subject to condensing moisture shall be insulated with UL recognized 1 ½ inch closed cell insulation. All joints and seams shall be carefully sealed to form a vapor barrier.
8. Provide factory-mounted and wired, thermal-dispersion water flow switches on each vessel to prevent unit operation with no or low water flow. Paddle and pressure differential type switches are not acceptable due to high rates of failure and false indications from these types of flow indicators.

C. Long Term Reliability
   1. All compressor/motor designs that require oil to lubricate their respective roller/ball bearing system must denote exactly how many gallons of oil are required for safe operation. The manufacturer must then provide the engineer and owner with a real world energy analysis showing the energy degradation over time due oil contamination of heat transfer surfaces.
   2. Chillers containing oil shall include at no additional charge a 10 year parts and labor warranty on all oil system components including:
      a. Pumps
      b. Starter
      c. Piping
      d. Tank
      e. Heater
      f. Cooler
      g. Controls
      h. Valves
   3. Manufacturer shall be responsible for covering all costs associated with annual oil and

oil filter changes plus oil analysis as required.

D. Vibration Isolation
   1. Provide neoprene waffle-type vibration isolators for each corner of the unit.

E. Chiller Control
   1. The unit shall have a microprocessor-based control system consisting of a 15-inch VGA touchscreen operator interface and a unit controller.
   2. The touch-screen shall display the unit operating parameters, accept setpoint changes (multi-level password protected) and be capable of resetting faults and alarms. The following parameters shall be displayed on the home screen and also as trend curves on the trend screen:
      a. Entering and leaving chilled water temperatures
      b. Entering and leaving condenser water temperatures
      c. Evaporator saturated refrigerant pressure
      d. Condenser saturated refrigerant pressure
      e. Percent of 100% speed (per compressor)
      f. % of rated load amps for entire unit
   3. In addition to the trended items above, all other important real-time operating parameters shall also be shown on the touch-screen. These items shall be displayed on a chiller graphic showing each component. At a minimum, the following critical areas must be monitored:
      a. Compressor actual speed, maximum speed, percent speed
      b. Liquid line temperature
      c. Chilled water setpoint
      d. Compressor and unit state and input and output digital and analog values
   4. A fault history shall be displayed using an easy to decipher, color coded set of messages that a date and time stamped. Time interval scale shall be user selectable as 20 mins, 2 hours, or 8 hours. The alarm history shall be downloadable from the unit's USB port. maintenance manual specific for the unit shall be viewable on the screen.
   5. All setpoints shall be viewable and changeable (multi-level password protected) on the touch screen and include setpoint description and range of set values
   6. Automatic corrective action to reduce unnecessary cycling shall be accomplished through preemptive control of low evaporator or high discharge pressure conditions to keep the unit operating through abnormal transient conditions.
   7. The chiller shall be capable of sequencing up to two other similar chillers and automatic control of: evaporator and condenser pumps (primary and standby), up to 3 stages of cooling tower fan cycling control and a tower modulating bypass valve or cooling tower fan variable frequency drives.
   8. All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided along with the unit submittal.
   9. The factory supplied VFD and controls should include the following:
      a. High short circuit panel rating of 35 kA with a field-supplied matching disconnect switch

b. Phase loss protection
c. Under/over voltage protection

10. Energy saving software logic shall at a minimum offer the following
    a. User programmable compressor soft loading
    b. Chilled water reset
    c. Demand limit control
    d. Staging options lead lag between multiple compressors on a single chiller or up to two other similar chillers.
    e. Plotting of historic trends for optimizing efficiency

2.05 REFRIGERANT MONITOR

A. General
1. Provide a complete installation of a refrigerant leak detection system including a main control panel, sensors, audible/visual alarm devices and emergency break glass switches. This system can be linked to a Controller Unit or to a BAS.
2. The system design shall consist of diffusion type sensors and a control unit.
3. The system shall include, but not be limited to, the following:
    a. Future expandability
    b. Display of refrigerant gas concentration
    c. Ability to modify alarm set points
    d. Interlocking with emergency system shut down
    e. Automatic and manual fan start/stop
    f. Display of alarm status
4. Provide self contained breathing apparatus (SCBA) as follows:
    a. One (1) unit will be provided and located immediately outside the mechanical room door.
    b. A second backup unit will also be provided

B. Expansion Unit
1. The controller shall provide a 4 -20 mA output signal for each sensor corresponding to the measured refrigerant levels of each sensor. In the event of a sensor or controller malfunction, the controller shall energize an on board fault relay and turn on a fault indicator on the front panel.
2. The controller shall continuously display the specified refrigerant concentration of each sensor via an LCD display. The controller shall have a minimum of three levels of activation for each detected refrigerant level. There shall be 3 relays corresponding to three alarm levels. The alarm A relay shall be energized and the first alarm (Alarm A) shall be initiated when the refrigerant concentration reaches or exceeds the programmed Alarm A level. Alarm A shall start the mechanical room ventilation equipment. The Alarm B relay shall be energized and the second alarm (Alarm B) shall be initiated when the refrigerant concentration levels reach or exceed the programmed Alarm B level. Alarm B shall energize an onboard red horn strobe unit attached to the controller or a remote red alarm horn strobe. All relays shall be form C, double pole double throw. Dry contacts shall be rated for 5 amps (resistive load) at 240 Vac.
3. The controller shall be wall mount type with the following features.
    a. Enclosure Type- The enclosure shall be NEMA 4 type. Access to the inside of the enclosure and wiring connections shall be through a front facing, full length door.

The door shall have a window size sufficient to allow viewing of a 2 line by 20 character LCD display.

b. Front Panel Controls- a four button keypad and fan start stop and alarm silence buttons shall provide access to all monitor functions including display, calibration, set-up and diagnostics.

c. Audible Alarm - A 65dBa (at 3 feet) audible alarm shall be internal to the controller; it shall sound when one of the pre-selected alarm conditions occurs.

d. 7) System Power Requirements - the system shall operate on 24Vac 2A max.

4. BACnet/IP communications capability can be provided to connect to the Building Automation System.

C. Detectors

1. The detector shall be of diffusion type with no internal sample pump or filter.
2. Detector sensitivity: The detector shall be capable of monitoring over a range of 0-1000 ppm with a resolution of 1 ppm.
3. Detector accuracy: The detector shall be capable of maintaining a response of ±8% @ range of 500 ppm.
4. Temperature- the system shall operate over a range of 0 to 40 degrees centigrade (32 to 104 degrees F)
5. Stability- the 30 day zero and span drift shall be less than 1% F.S. without the aid of automatic or manual recalibration. The system shall not employ any type of auto-zero techniques in order to maintain stability. The use of fresh air sources or scrubbers as zero reference is not permitted.
6. Calibration - The system must provide a menu driven method of checking both zero and span calibrations. Any adjustments must be made through the front panel keyboard.
7. Maximum distance between the sensor and controller shall not exceed 200 ft.
8. Detector alarm levels shall be activated with the following parameters.
   a. Carbon Monoxide, 25 ppm - 1st alarm setpoint, 200 ppm - 2nd alarm setpoint, 225 ppm - 3rd alarm setpoint, 5ft A.F.F mounting height, 50ft coverage.
   b. Refrigerant, 250 ppm - 1st alarm setpoint, 500 ppm - 2nd alarm setpoint, 900 ppm - 3rd alarm setpoint, 1ft A.F.F mounting height, 1 per chiller.

D. Accessories

1. Strobe and Horn
   a. Provide at each entrance and in the space. A total of two strobe and horns shall be provided.
2. Emergency break glass switches
   a. Break glass manual switches shall be equivalent to Honeywell Analytics, type EMBG.
3. Self Contained Breathing Apparatus
   a. SCBA must be equivalent to Honeywell Analytics NIOSHSCBA with the ability to be wall mounted using Honeywell Analytics wall mount case SCBAWALLCASE.

E. Execution

1. Install in accordance with ASHRAE 15.
2. The Refrigerant Leak Detection system shall be installed complete and in accordance with the manufacturer's installation instructions.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service.

C. Coordinate electrical installation with electrical contractor.

D. Coordinate controls with control contractor.

E. Align chiller on concrete foundations, sole plates, and sub-bases. Level, grout, and bolt in place.

F. Provide evaporator connections to chilled water piping.
   1. On inlet, provide:
      a. Thermometer well for temperature controller.
      b. Thermometer well and thermometer.
      c. Strainer.
      d. Nipple and flow switch.
      e. Flexible pipe connector.
      f. Pressure gage.
      g. Shut-off valve.
   2. On outlet, provide:
      a. Thermometer well and thermometer.
      b. Flexible pipe connector.
      c. Pressure gage.
      d. Shut-off valve.

G. Insulate evaporator and cold surfaces.

H. Provide condenser connection to condenser water piping.
   1. On inlet, provide:
      a. Thermometer well for temperature controller.
      b. Thermometer well and thermometer.
      c. Strainer.
      d. Nipple and flow switch.
      e. Flexible pipe connector.
      f. Pressure gage.
      g. Shut-off valve.
   2. On outlet, provide:
      a. Thermometer well and thermometer.
      b. Flexible pipe connector.
      c. Pressure gage.
      d. Shut-off valve.

I. Arrange piping for easy dismantling to permit tube cleaning.

3.02 SYSTEM STARTUP

A. Factory Start-Up Services: Provide for as long a time as is necessary to ensure proper

operation of the unit, but in no case for less than two full working days. During the period of start-up, the start-up technician shall instruct the owner's representative in proper care and operation of the unit.

B. Supply initial charge of refrigerant and oil.

3.03 MAINTENANCE

A. Contractor shall provide all inspections and routine maintenance as outlined by the manufacturer's literature for a period of one year from date of substantial completion. Including but not limited to:
   1. Compressor
   2. Controls
   3. Condenser
   4. Evaporator
   5. Expansion Valve
   6. Electrical
   7. A full inspection after 3 to 4 weeks of normal operation

B. Where recommended by the manufacturer's literature, maintenance shall be performed by factory service personnel.

C. See the routine maintenance schedule in the equipment operation and maintenance manual for more information.

END OF SECTION

SECTION 15940 - HVAC SEQUENCE OF OPERATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of operation for:
   1. Central refrigeration systems.

1.02 RELATED SECTIONS

A. Section 15926 - Digital Control Equipment.

B. Section 15928 - Instruments and Control Elements.

1.03 SYSTEM DESCRIPTION

A. This Section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other Sections.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
   1. Include at least the following sequences:
      a. Start-up.
      b. Normal operating mode.
      c. Unoccupied mode.
      d. Shutdown.
      e. Capacity control sequences and equipment staging.
      f. Temperature and pressure control, such as setbacks, setups, resets, etc.
      g. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
      h. Effects of power or equipment failure with all standby component functions.
      i. Sequences for all alarms and emergency shut downs.
      j. Seasonal operational differences and recommendations.
      k. Interactions and interlocks with other systems.
   2. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   3. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.

C. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
   1. Label with settings, adjustable range of control and limits.
   2. Include flow diagrams for each control system, graphically depicting control logic.
   3. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.

D. Points List: Submit list of all control points indicating at least the following for each point.
   1. Name of controlled system.
   2. Point abbreviation.
   3. Point description; such as dry bulb temperature, airflow, etc.
   4. Display unit.
   5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
   6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
   7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
   8. Calculated point (Yes / No); i.e. a “virtual” point generated from calculations of other point values.

E. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

PART 2 PRODUCTS

2.01 CONTROLS

A. Reuse existing Central Control and Monitoring System and controlers for new chiller and pumps. Integrate existing operation of Cooling tower with new chiller and pumps.

B. Controls contractor shall be Emcor Group, Inc.

PART 3 EXECUTION

3.01 CENTRAL REFRIGERATION SYSTEMS

A. Time Schedule: Start and stop chilled water pump.

B. Condensing Water Pump: Allow start on proof of water in cooling tower sump and on outdoor temperature above 50 degrees F.

C. Energize chilled water pump to start and allow cooling tower fans to start when condensing water pump started.

D. When chilled water flow is proven by flow switches, allow refrigeration machine to start.

E. Chillers shall be controlled via their own internal controls to maintain chilled water supply temperature. See section 15623 for more information.

F. Upon failure of any primary pump alarm BMS.

G. Display:
1. System graphic.
2. Condensing water pump on/off indication.
3. Chilled water pump on/off switch.
4. Chiller on/off indication.
5. Chiller condensing water supply and return temperature.
6. Chiller chilled water supply and return temperature.
7. Chiller condensing water control point adjustment.
8. Common chilled water control point adjustment.

END OF SECTION

SECTION 15950 - TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of refrigerating systems.

B. Measurement of final operating condition of HVAC systems.

1.02 REFERENCE STANDARDS

A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council; 2002.

B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1988, with 1997 Errata.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau; 2005, Seventh Edition.

1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   2. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
   3. Include at least the following in the plan:
      a. Preface: An explanation of the intended use of the control system.
      b. List of all water flows, sound levels, system capacities and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      c. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      d. Identification and types of measurement instruments to be used and their most recent calibration date.
      e. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      f. Final test report forms to be used.
      g. Expected problems and solutions, etc.
      h. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
      i. Time schedule for TAB work to be done in phases (by floor, etc.).

j. Description of TAB work for areas to be built out later, if any.
k. Time schedule for deferred or seasonal TAB work, if specified.
l. False loading of systems to complete TAB work, if specified.
m. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
n. Procedures for formal progress reports, including scope and frequency.
o. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Progress Reports.

E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
1. Submit under provisions of Section 01400.
2. Revise TAB plan to reflect actual procedures and submit as part of final report.
3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
4. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
7. Units of Measure: Report data in both I-P (inch-pound) and SI (metric) units.
8. Include the following on the title page of each report:
a. Name of Testing, Adjusting, and Balancing Agency.
b. Address of Testing, Adjusting, and Balancing Agency.
c. Telephone number of Testing, Adjusting, and Balancing Agency.
d. Project name.
e. Project location.
f. Project Engineer.
g. Project Contractor.
h. Project altitude.
i. Report date.

F. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. AABC MN-1, AABC National Standards for Total System Balance.
2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of

Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
3. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
4. SMACNA HVAC Systems Testing, Adjusting, and Balancing.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Certified by one of the following:
a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.

E. TAB Supervisor Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Hydronic systems are flushed, filled, and vented.
5. Pumps are rotating correctly.
6. Proper strainer baskets are clean and in place.
7. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.03 ADJUSTMENT TOLERANCES

A. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
2. Discrepancies, deficient or uncompleted work by others.
3. Contract interpretation requests.
4. Lists of completed tests.

B. Ensure recorded data represents actual measured or observed conditions.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.05 WATER SYSTEM PROCEDURE

A. Adjust water systems to provide required or design quantities.

B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.

C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.

D. Effect system balance with automatic control valves fully open to heat transfer elements.

E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.

F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

3.06 SCOPE

A. Test, adjust, and balance the following:
   1. HVAC Pumps
   2. Magnetic Bearing Water Chillers

3.07 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
   1. Manufacturer
   2. Model/Frame
   3. HP/BHP
   4. Phase, voltage, amperage; nameplate, actual, no load
   5. RPM
   6. Service factor
   7. Starter size, rating, heater elements
   8. Sheave Make/Size/Bore

B. Pumps:

1. Identification/number
2. Manufacturer
3. Size/model
4. Impeller
5. Service
6. Design flow rate, pressure drop, BHP
7. Actual flow rate, pressure drop, BHP
8. Discharge pressure
9. Suction pressure
10. Total operating head pressure
11. Shut off, discharge and suction pressures
12. Shut off, total head pressure

C. Chillers:
1. Identification/number
2. Manufacturer
3. Capacity
4. Model number
5. Serial number
6. Evaporator entering water temperature, design and actual
7. Evaporator leaving water temperature, design and actual
8. Evaporator pressure drop, design and actual
9. Evaporator water flow rate, design and actual
10. Condenser entering water temperature, design and actual
11. Condenser pressure drop, design and actual
12. Condenser water flow rate, design and actual

END OF SECTION

SECTION 16010 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work included in these specifications and included on the drawings shall include furnishing all labor, materials, supplies, and equipment to perform all work required including cutting, channeling, chasing, excavating and backfilling, demolition (if any) to install a complete and working electrical system(s) in accordance with these sections of the specifications and the accompanying drawings. This shall include all required preparation work, demolition, raceways, coordination, etc. required to install the electrical system.

B. It is recognized that separate subcontracts may be instituted by the General Contractor or the Division 16 Contractor with other contractors and/or suppliers. It is the responsibility of the Division 16 Contractor to completely inform, coordinate and advise those subs as to all of the other requirements, conditions and information associated with providing and installing the total job.

C. The electrical work shall include, but in no way be limited to the following:
   1. Raceways Systems
      a. Power
   2. Electrical Distribution System
   3. Power Systems
      a. Interior

1.02 RELATED SECTIONS

A. Drawings and specifications including General Conditions, Supplementary Conditions and Division 1 specification sections, apply to work of this and all sections in Division 16. Division 16 General Provisions described in this section apply to all sections of Division 16.

1.03 SUBSTITUTION AND THE "OR EQUAL" CLAUSE

A. Where a manufacturer and/or model number is noted in a specification, that manufacturer and/or model number shall be the equipment used on the project. Substitutions may be allowed for some/all of the specified equipment where approved by the Architect/Engineer per the process as outlined in this section of the specifications. When an item, piece of equipment, method, etc. is specified or called for on the drawings or in the specifications, it shall establish a standard of quality which shall be used to evaluate all substitutions. It is not the intent of this specification to limit competition in any way, however; in some evaluations the decision of equality depends to a certain extent personal opinion and preference. In all evaluations, the opinion and decision of the engineer shall be final and binding to all parties.

B. All substitutions to the specified equipment manufacturer, make, or model, shall be approved before bid. Request to substitute a material, item, or method for a specified material, item, or method shall be made in writing and submitted so as to be received by the engineer at least ten (10) days before bid date. All approved request shall be noted in an addendum. Only the specified materials and items noted in the addendum as approved equals shall be used on the project.

C. All submittals to request to substitute shall clearly describe the product. Request to substitute shall include catalog descriptive material, engineering data, and also list areas where the requested material exceeds or falls short of the specification for the specified material. If requested, provide samples (To be retained by the Engineer) of the proposed item.

D. Incomplete submittals, or submittals that require the Engineer to spend considerable time researching the item, will not be considered for approval. The burden of proof that an item is equal to the specified item is on the party requesting the substitution. In all evaluations, the opinion and decision of the engineer shall be final and binding to all parties.

E. Request to substitute or obtain approval to substitute for an item or material that has been previously turned down, will not be considered.

F. When approval to substitute an item for the specified item is granted, the approval does not relieve the contractor from compliance with all system functions or equipment characteristics.

G. When a substituted item requires additional work for another contractor or subcontractor to adjust his work to accommodate the substituted item, the contractor who made the substitution shall pay all cost for accommodation of the substituted item.

H. As with any substituted item, it is the responsibility of the contractor making the substitution to make the item fit, function, and act as the specified item. If, in the opinion of the engineer, the substituted item does not comply, function, fit, or perform to the standards of the specified item, the contractor shall remove the substituted item and install the specified item, at no cost to the Owner.

I. Contractor prices shall be based on only the specified items, materials, or methods (or approved equals). There shall be no increase in contract cost when a non-approved item is used in pricing and is not approved by the engineer.

1.04 REFERENCES

A. The Contractor is responsible for obtaining all required permits and complying with the current editions, or the editions referenced in the other individual sections of these specifications, of all applicable National (NEC, IBC, NFPA), State, County, and Municipal codes and regulations. This shall include, but not be limited to, the following:
   1. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
   2. NEMA MG 1 - Motors and Generators; National Electrical Manufacturers Association.
   3. NFPA 70 - National Electrical Code; National Fire Protection Association.
   4. Federal Occupational Safety and Health Act (OSHA)
   5. Americans with Disabilities Act (ADA).
   6. International Building Code (IBC); 2009.
   7. SSPC-Paint 15 - Steel Joist Shop Paint; Society for Protective Coatings; 1999 (Ed. 2000).

B. Unless noted otherwise, the contractor shall comply with the latest edition and update of any and all codes and standards.

C. Compliance with Underwriters Laboratories: All products installed under the contract shall

have the Underwriters Laboratories (UL) label where such marking is available. Products which are not UL labeled will not be acceptable if labeled products are available from another approved manufacturer.

D. The above listed requirements are required of the electrical contractor by this contract whether these requirements are shown on the drawings, mentioned in the specifications or not.

E. All work and equipment installed that does not comply with the codes and standards noted above shall be corrected and/or replaced (at engineer's option) at no cost to the Owner.

F. The contractor(s) shall submit all items necessary to obtain all required permits to the appropriate Federal/State/County/City agencies, obtain all required permits, and pay for any and all required fees.

1.05 DEFINITIONS

A. Concealed - Embedded in masonry or installed within other building elements including but not necessarily limited to crawl spaces, spaces above ceilings, in walls, in chases, shafts . It shall also inlcude conduit installed in the ground beneath a floor slab. Not visible.

B. Exposed - Installed in such a manner that it can be seen. All exposed materials shall be installed in a neat manner. If in the engineer's opinion the installed materials are not installed in a neat manner, it shall be removed and reinstalled (at the Contractor's expense) to the satisfaction of the engineer, all at no increase cost to the Owner.

C. Furnish - When used in the Division 16 plans and/or specifications the word "furnish" shall mean to purchase a piece of equipment or material and to have said equipment/material transported to the project site (or other location if so directed). All items to be furnished shall include any and all mounting hardware, support, and accessory required for installation and proper operation. Unless otherwise noted, when a piece of equipment or material is to be furnished by the contractor, it shall also be installed.

D. Provide - When used in the Division 16 plans and/or specifications the word "provide" shall mean to furnish and install complete and ready for use and to put into operation. Include any and all options, accessories, and mounting/installation hardware required for a complete and operating system or element of the electrical system.

E. Install - When used in the Division 16 plans and/or specifications the word "install" shall mean to unload and transport the equipment/material to the installation point of the job site. Any and all mounting hardware (whether specified or called for by name / model number, or not) shall be included. Perform every operation necessary, including any and all final adjustments, etc. required for proper operation.

F. Controlled – When used in the Division 16 plans and/or specifications, the word “controlled” shall mean to govern delivery of operating voltage or power to equipment or systems by means of, but not limited to, feeders, disconnects, breakers, switches, starters, etc..

1.06 COORDINATION OF WORK IN OTHER SECTIONS

A. The Division 16000 contractor is responsible for including any and all work related to the

electrical that is noted in any part of the specifications or any part of the drawings, including Divisions 1, 15 and any other sections.

B. If any piece of equipment is shown on any part of the drawings ("A" (Architectural) drawings, "M" (Mechanical) drawings, "P" (Plumbing) drawings, or "E" (Electrical) drawings), it is the responsibility of the Division 16 Contractor to furnish and install electrical service as required to that equipment. Do a complete review of all contract documents and include electrical service for all such equipment whether or not it is also shown in Electrical documents. Electrical service shall comply with all requirements of the equipment shop drawings and all codes.

C. The Division 16 Contractor will supply power to equipment at the voltage indicated on the Division 16 drawings. The Division 16 Contractor and all other contractors will be held responsible for coordinating the equipment voltages, control equipment, wiring, and locations and type of terminations/connections and/or disconnects required to comply with the National Electrical Code, International Building Code, all local codes, and the equipment manufacturer's requirements. If equipment is furnished to the project at a voltage other than that shown on the Division 16 drawings, the contractor supplying the equipment and all other subcontractors will be held responsible for making any necessary adjustments to correct the conflict, to the satisfaction of the Electrical Engineer.

1.07 INTERPRETATION OF THE DRAWINGS AND SPECIFICATIONS (CONTRACT DOCUMENTS):

A. Refer to the section of the specifications which cover General Conditions, Division 1, and Instructions to bidders. These sections and their requirements are a part of this contract and are binding on this section of the work.

B. Electrical Drawings are diagrammatic in nature except where specific dimensions, or specific details are shown on the electrical, mechanical, or architectural drawings. The Electrical Contractor shall refer to other drawings for exact locations of equipment, building dimensions, architectural details and conditions affecting the electrical work; however, field measurements take precedence over dimensioned drawings. The Electrical Contractor shall provide all labor and materials and all incidental elements; junction and pull boxes, filters, pull wires, connectors, support materials, fuses, disconnect switches, lamps, and labels, to install, connect, start-up and result in a complete and working system in accordance with the drawings and specifications. Unless noted otherwise on the plans or in these specifications, all final connections are the responsibility of the Division 16 Contractor.

C. In order to show the electrical work required under this contract on the drawings, it is necessary to utilize symbols and schematic diagrams/details. These symbols and schematic diagrams/details do not have any dimensional significance nor do they delineate every item required for the intended installations. The work shall be installed in accordance with the intent diagrammatically expressed on the drawings, and in conformity with the dimensions indicated on the final architectural and structural working drawings and on equipment shop drawings. No interpretation shall be made from the limitations of symbols and diagrams that any elements necessary for complete work are excluded.

D. When the details of specific and/or general installation requirements show specific dimensioning and/or positioning requirements of the items to be installed, these dimensions

shall be field verified and followed. It is the intent of these details to only establish the general feasibility of the work required. These details in no way delete, reduce, or substitute the requirement of field coordination for the indicated work.

E. The contractor is responsible for coordinating the installation of all electrical work with the work of other contractors and/or trades. This contractor shall refer to the other drawings (demolition, site, civil, architectural, kitchen, structural, plumbing, mechanical, etc.) to assure that the installed electrical work is installed in a coordinated fashion. Conflicts on installation work due to the lack of proper coordination of this contractor shall result in the work being removed and coordinated and properly reinstalled at no increase cost to the Owner. Report to the Engineer any and all discrepancies that the contractor(s) find in the field between the electrical drawings and the other drawings.

F. The installation of any and all equipment/systems is subject to clarification as indicated in the review comments of the Engineer on the shop drawings. The contractor shall be aware that if the equipment of an approved equal manufacturer is to be installed, the equipment, controls, functions, conduit routing, power requirements, etc. may be different. It is the responsibility of the electrical contractor to coordinate the installation requirements of the equipment to be installed with the electrical plans of the specified equipment/systems. If there are any additional equipment, power service, conduit, conductors, controls, etc. required to install the approved equal equipment, these additional requirements shall be furnished and installed at no additional cost to the Owner.

G. The electrical drawings are such that the electrical service to equipment furnished and installed under other sections of the contract documents (examples, but not limited to: elevators, kitchen equipment, HVAC equipment, water heaters, fans, pumps, motors, etc) is coordinated for the specified equipment only. If the equipment installed under other divisions of the contract documents is not the specified equipment and is an approved equal to the specified equipment, it is possible that the equipment will require different electrical service/interface than that shown on the electrical plans for the specified equipment. In this case, it is the responsibility of the approved equal installing contractor / manufacturer to coordinate the electrical service/interface requirements with the electrical contractor. If the electrical service/interface requirements of the substituted equipment are greater than the specified equipment and result in an increased electrical cost, it is the responsibility of the furnishing/installing contractor to pay the electrical contractor for the increase in electrical cost.

H. Submission of a proposal and ultimate acceptance of an agreement or contract for execution of this section of work will be construed as evidence that the Electrical Contractor and each interested Subcontractor and/or vendor has carefully read and accepts all conditions set forth in each Division under specification Divisions titled "Instructions To Bidders" and Division 1, "General Conditions", in so far as such conditions may affect both the bidding for and execution of this section of work.

1.08 ELECTRICAL SYSTEMS

A. All electrical systems shown on the plans or specified in the specifications shall have equipment furnished and installed so that the system is a complete and functioning system that complies with the intent of the specifications, whether each and every element of each

and every system is specified or not. Any and all equipment, options, and system elements necessary for proper operation shall be furnished and installed, whether specifically called for (specified by name or catalog number) or not.

B. The wiring, connections, and support elements shown on the plans or noted in the specifications is for a complete and workable system(s). Any deviations from the wiring shown due to a particular manufacturer's requirements shall be made at no cost to either the contract or to the Owner. Changes in electrical service to equipment due to substitutions of equipment by any contractors shall be at the cost of that contractor.

1.09 SPECIAL ELECTRICAL REQUIREMENTS

A. Provide all wiring, connectors, fittings, connections, and all accessories for the complete installation of, and final connections to, equipment furnished under other divisions of the specifications and where indicated on the electrical drawings or otherwise specified.

B. The Electrical Contractor shall coordinate with all other contractors the electrical service provided as shown on the electrical plans with respect to voltage, phase, and ampacity. This coordination shall take place before any equipment is ordered and is for the purpose of the contractor providing equipment that requires electrical connection ordering the correct equipment to match the electrical service provided. Any changes in the characteristics of the circuits that serve any electrically operated equipment shall be made at no additional cost to the Owner.

C. Make all final connections to all equipment, provided under the electrical contract and equipment provided under other sections, except where noted on the plans to provide "rough-in only". Where connections are to be made by someone other than the Division 16 contractor, coordinate with the equipment supplier to determine the rough-in requirements. In the case where rough-in is installed now but equipment unknown or is to be installed in the future, install outlet box sized for the conductors installed, install conductors and leave 8" of pigtails for each conductor. Tape all conductors, leave a note in the box as to the panel the circuit is connected, and install a cover plate over the outlet box. In the panel that the circuit terminates, do not connect the circuit to a breaker, tag the circuit with information as to the location of the outlet box, and leave enough pigtail in the panel so that connection can be made to any breaker space in the panel.

D. The Electrical Contractor is hereby alerted that certain features of control, other functions, or systems may be specified in this division by performance, and as such, all elements of wiring or other materials and devices for the complete installation may not be shown on the drawings. The Electrical Contractor shall provide for the final and complete installation of all features called for by drawings or specifications.

E. Note that the Mechanical Division includes furnishing all motors for equipment furnished and installed by Division 15. In addition, unless otherwise shown on the electrical drawings, starters for Division 15 equipment shall also be provided by Division 15. The Division 16 work shall include installing all of the individually mounted, stand alone starters and the power wiring from the electrical system through ALL motor starters to the final connection to the motors. Where motors are served through a Motor Control Center (MCC), motor starters are a part of the motor control center and are furnished and installed through the Electrical Division (Division 16). Where motors are served through a Motor Control Center

(MCC), the Division 16 Contractor is responsible for coordinating with the Division 15 Contractor the size, type, horsepower, speed, number of speeds, windings, voltage, and recommended heater size for all motors. From this coordination the Division 16 Contractor shall furnish and install in the Motor Control Center the starters as required to serve the motors on the project. The only exception for this requirement of the Division 16 scope furnishing and installing starters shall be where the Division 15 equipment has a control panel that includes the starter and/or disconnect. Coordinate with Division 15.

F. Where equipment is prewired, the power wiring shall extend to the power terminals of the pre-wired equipment. Control wiring for the mechanical equipment and temperature control wiring is covered under Division 15 and is not a part of Division 16 unless specifically noted.

G. All safety disconnect switches shall be provided under Division 16 except where the Division 15 equipment is equipped with factory installed disconnects. Where the switch designation calls for the switch to be fused, the electrical contractor shall furnish and install fuses that are sized in accordance to the equipment nameplate of the equipment served.

1.10 DIMENSIONS ON DRAWINGS, IN FIELD, VERIFICATION

A. The contractor shall be responsible for visiting the site in order to become familiar with existing conditions and coordinating the required work as needed. No increase in contract cost will be considered due to the contractor not being aware of existing conditions.

B. Do not scale drawings. Confirm all dimensions in the field. Coordinate all installations with shop drawings and other contractors work. Where discrepancies are found on the contract documents, the contractor shall include in the project cost any and all materials, items and labor required to make any and all changes required to install the work correctly. Where discrepancies are found on the project the contractor shall stop work in that area and contact the engineer.

1.11 SUBMITTALS

A. Unless otherwise noted, Submittals (formerly/also referred to as “shop drawings”) shall be made in accordance with requirements as stated in Division 1. Submittals shall be submitted to the Engineer on all equipment within thirty (30) days of contract award. If submittals are not received within the thirty day time limit the specified equipment shall be used (no exceptions).

B. The Contractor shall not purchase any materials or equipment prior to the receipt of approved submittals from the Engineer. Any commitment to purchase or contract to purchase equipment or materials made between the Contractor and an equipment supplier and/or manufacturer before the receipt of approved submittals from the Engineer shall be at the risk of the Contractor. If submittals are not approved, any restocking charge or cancellation charge by a manufacturer and/or supplier shall be the responsibility of the Contractor and not reflect as an increase cost to the Owner

C. Submittals shall contain all the necessary information required to prove that the equipment will fit and function correctly. Submittals shall be bound together and submitted as a complete package for each section. The Contractor shall review each submittal to confirm that the submittal meets the Contractor's requirements before the submittal is made to the

Engineer.

D. It is not unreasonable to expect a 14 to 21 day (or possibly longer) submittal turnaround from the Engineer. Therefore it is imperative that the Contractor comply with the 30 day requirement outlined in paragraph A. If the project is a "Fast Track" type project, it may be necessary to have submittals reviewed in a very short time period. In such cases, the contractor shall note on the cover sheet of the submittal the date in which submittals must be returned. Every effort will be made to comply with this date, but close coordination between Contractor and Engineer shall be required.

E. The engineer reserves the right to refuse any equipment that in his opinion will not function as well as the specified equipment. The opinion of the engineer shall be final and shall bind all parties. The Engineer has the right to require the contractor to use the specified equipment if the second shop drawing submittal is not approved.

F. Submittal review is only for verifying general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Provide equipment and/or devices for which the electrical service requirements matches that shown on the contract documents for the equipment and/or device in question. It is the responsibility of the contractor to submit a separate formal request to change voltages or other aspects of the electrical service for a given piece of equipment or device if a change is desired. It is not incumbent on the engineer to recognize changes in electrical service contained in the shop drawing submittal. The contractor is also responsible for dimensions to be confirmed and correlated at the job site; for information that pertains solely to the fabrication processes or to techniques of construction; and for coordination of the work of all trades.

G. The Contractor shall review the submittals and make note of all dimensions of the equipment and shall make the necessary adjustments in equipment locations as required to install the equipment. THE CONTRACTOR SHALL NOT INSTALL ANY EQUIPMENT OR PROVIDE ELECTRICAL ROUGH-INS BEFORE APPROVED SUBMITTALS ARE RETURNED BY THE ENGINEER AND DIMENSIONS ARE APPROVED.

H. Approval to substitute material, equipment, devices, processes, or any item as an "as/an equal" to the specified item does not relieve the Contractor of the full responsibility to make the substituted material, fit, function or appear as required in the Drawings and Specifications. Contractor shall assume full responsibility for the satisfactory adaptability of a substituted item to those items specified or shown on the drawings.

I. Required submittals are listed with each section of the electrical specifications.

1.12 RECORD DRAWINGS

A. The electrical contractor shall keep a set of construction drawings during the length of the project on which he shall note any and all changes from the original drawings. Of special importance is noting the actual location of all service entrances into the building and where conduit stub outs have been insalled. This record set of drawings shall be updated daily. The drawings shall be neat, orderly and marked in a way to be clearly interpreted. The record drawings shall be turned over to the Architect to update drawing files for a final set of drawings for the owners record.

B. When the submitted information has been deemed satisfactory and all information has been transferred by the architect to the drawing files, they shall be labeled as "RECORD DRAWINGS" and copies turned over to the owner. Only then will final approval and payment be approved.

C. After the "RECORD DRAWINGS" have been approved by the Engineer, the contractor shall have one set of prints made from the "Record Drawings" and shall wall mount a 4" PVC tube with screw on cap in the main electrical room and place the set of prints in this tube.

1.13 CHANGE ORDERS

A. Change orders will not be issued for relocating electrical equipment or rerouting conduit and wiring. This section of the electrical specifications require that relocating of electrical equipment or rerouting of conduit/wiring be done at no additional cost to the Owner.

B. When change orders are required for electrical work, the unit material and unit labor method shall be used. Unit values for material shall be contractors' net cost from distributor. Unit values for labor hours shall not be greater than those listed in the latest addition of Means mechanical/electrical cost data. Sales tax is to be added to materials and workman's compensation insurance is to be added to labor. Overhead and profit markup is to be added to the materials and labor subtotal per the instructions in Division 1..

C. To calculate a credit for deleted work, the identical method of calculations shall be used for deleted work that is used for new work. No money will be allowed for lost scheduling time or estimation time. The Engineer agrees to expedite change orders as rapidly as possible to avoid construction delay. The contractor may be required to estimate a number of alternatives for change orders in order to arrive at the lowest cost for change orders.

D. There shall be no additional cost for the contractor to estimate multiple alternatives for consideration.

1.14 QUALITY ASSURANCE

A. The contractor performing the electrical work shall employ craftsmen who are thoroughly experienced and trained in the installation of electrical systems and general installation coordination. All work shall be done in the highest level of standards for the trade. Any work installed at a level that is less than the highest level of standards for the trade shall be removed and reinstalled in the manner described above at NO additional cost to the Owner.

B. All equipment shall be installed in compliance with the manufacturer's published installation recommendations and requirements, with any and all required accessories and mounting hardware, and/or as approved by the Engineer. The manufacturer's published installation requirements and recommendations shall become a part of the Owner's Manual (See Paragraph 1.15)

1.15 DELIVERY, STORAGE, AND PROTECTION

A. Where equipment is purchased by the electrical contractor to be installed in conformance with the contract documents, the contractor shall follow the following procedure as it relates to delivery, storage, and installation:
   1. Coordinate any and all information with any and all contractors who are to do work to

accommodate the division 16 equipment/work.

2. Coordinate delivery of equipment.
3. Unload the equipment from delivery trucks.
4. Inspect equipment for damage. Report damage immediately and arrangef ro the equipment to be repaired or replaced. No claims for time extensions or additional work related to the damage will be accepted if not made within ten days of the delivery of the equipment.
5. Inspect the equipment to assure correct make, model number, voltage, etc.
6. Provide for safe handling and field storage up to the time of permanent placement in the project.
7. Provide for any and all field assembly and internal connection as may be necessary for proper operation.
8. Install in place including any and all required mounting supports, connectors, fittings, connections, and accessories required for complete system operation.

1.16 MANUFACTURER'S FIELD SERVICES:

A. Provide manufacturers field services where required under the specific sections of the Project Manual using authorized and trained manufactures represtatives of the equipment or systems in question. The field services shall include the following as a minimum:
   1. Inspect the installation to verify that the installation meets or exceeds all manufacturer's requirements and recommendations for proper operation.
   2. Start/energize the equipment and verify that the equipment/system is operating and functioning as required by these specifications and the manufacturer's requirements.
   3. Provide written certificaiton that field services have been performed and that equipment/system is operating and functioning as required by these specifications and the manufacturer's requirements. Submit the certification as part of the closeout documents.

B. Refer to specific sections of the Project Manual and provide all field service requirements listed in addition to these general requirements.

1.17 WARRANTY

A. All work, equipment, and materials shall be new and without defects or blemishes, and guaranteed to be free from defects for a period of one (1) year after the final date of project acceptance as defined by the Architect (NOT THE DATE OF INSTALLATION OR START-UP). All installation and installation materials shall also be guaranteed for the one (1) year period. This shall cover such items as equipment pads, supports, leaks from around equipment installation, etc and is intended to cover everything installed or provided under this division of the contract.

B. Manufactured pieces of equipment shall have their guarantee also backed by the equipment manufacturer.

C. During the guarantee period there shall be no charge to the Owner for items and work done under the guarantee clause (Service calls). This shall apply to replacement equipment, equipment shipping charges, mileage, labor, all taxes, etc.

D. Refer to the other sections of the Project Manual for warranty requirements that may exceed

these general requirements and follow those requirements for the equipment, devices, materials or systems in question.

PART 2 PRODUCTS

2.01 GENERAL:

A. All products shall be of new manufacturer (unless the plans and/or other sections of this specification call for existing or other identified products to be used), age of less than one year, and the latest model of a manufacturer. A new product shall not be used if the manufacturer has introduced a product as a replacement. All materials and apparatus for the work shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit into the building spaces in compliance with all code requirements.

B. By providing equipment to the project, a manufacturer guarantees to provide replacement parts for the equipment for a period of ten (10) years, even if the item provided goes out of manufacture.

C. Manufacturer's catalog numbers listed are not necessarily complete and are for general identification only. It is the responsibility of the Contractor to provide complete catalog numbers and to provide all accessories for installation as implied by the accompanying description of the equipment, material or device, the demonstrated use on the drawings, and the specifications contained herein. Products provided shall be a standard product which has a history of successful installation and operation for a minimum period of two years. Prototype or custom made equipment is not acceptable unless so specified herein.

D. Manufacturer's instructions shall be obtained by the Contractor and used for the installation of all equipment and devices where such manufacturer's instructions are available.

E. Where a substituted product is used instead of the specified product, the contractor will assume any and all responsibility for the product to fit, function and perform as well as the specified product. The opinion of the engineer will be binding and shall govern all parties as to a substituted product performing as well as the specified product.

F. Completeness: Provide all boxes, off-sets, bends, raceways, devices, raceway supports, installation brackets and supports, flexible connections, wiring connectors, labels and terminals for the complete installation and operation of all products. Each unit of product shall be assembled and installed and all surfaces shall be clean and free of dents, scratches, and abrasions or marred areas.

PART 3 EXECUTION

3.01 GENERAL

A. Before any work is started, the electrical contractor shall coordinate the work of other contractors that will affect the work of the electrical contractor. The electrical contractor shall inspect the work of all other trades to determine if the other work is ready for the electrical contractor to start his work.

B. Any and all electrical installations shall be coordinated with other trades, contractors and the Owner.

C. The contractor shall make himself familiar with existing conditions, site information, etc. so that conflicts are avoided.

D. All work shall be installed per all applicable code, rules, regulations, shop drawings and manufacturer's installation recommendations.

E. The electrical contractor shall be responsible for returning to original, pre-construction condition, any paved areas, sidewalks, planting, walls, and other areas disturbed during electrical installation work.

F. The electrical equipment shall be installed as close as possible to the location as shown on the plans. If during the installation, it is required to install equipment in locations other than the one shown on the plans, the contractor shall make a sketch of the proposed changes, submit it to the Engineer, and after the Engineer has given approval, then proceed with the installation.

G. Working spaces and clearances shall not be less than the required minimums in the National Electric Code (NEC).

3.02 EXAMINATION

A. The Electrical Contractor is responsible for visiting and examining the site to determine those portions of the site or present buildings affected by this work so as to become familiar with existing conditions and difficulties that will attend the execution of the work, before submitting proposals.

B. Submission of a proposal will be considered as evidence that such examination has been made and later claims for labor, equipment, or materials because of difficulties encountered, which could have been foreseen had such examination been made, will not be recognized.

3.03 ADDITIONS RENOVATIONS AND REMODELING

A. All electrical work shall be coordinated and phased so as to assure electrical service to any other buildings or parts of buildings that require use during construction.

B. All existing electrical system elements shall be protected from damage during any and all additions, renovations, and remodeling.

C. All new electrical equipment and installations shall be installed and connected to existing work or existing electrical system elements in a neat and careful manner. Any existing electrical work or system elements that are disturbed or damaged shall be replaced or repaired to the pre-construction condition at no additional cost to the Owner.

3.04 LOCATIONS OF EQUIPMENT REQUIRING ELECTRICAL SERVICE AND CONNECTIONS:

A. Coordinate the exact installed location of equipment that requires electrical connections that is furnished and installed by other contractors. The electrical drawings try to show the correct location of all of these items, but it is the responsibility of the electrical contractor to coordinate with all other contractors to determine the exact installed location of all equipment furnished and installed by other contractors and wired by the electrical contractor. Such coordination shall include, but not limited to exact location, location of

electrical connection, type of connection required, and electrical characteristics.

3.05 OPENINGS, CUTTING AND PATCHING:

A. Contractor shall arrange for openings in the building structure or components to allow for installation of electrical work or transport of electrical equipment as the project progresses.

B. Any cut portion of the building, wall, sidewalk, paved drives, ceiling, floors, roofs, etc., install any raceway or apparatus or transport equipment, shall be restored in a manner such that the end product complies with the specification for that type of work. Where existing work is cut, restore to the original (pre-construction) condition. The electrical contractor shall be responsible for returning to original, pre-construction condition, any of the above noted areas or other areas disturbed during electrical installation work.

C. Structural, load bearing, or supporting device shall not be cut without approval in writing from the Architect.

3.06 EXAMINATION OF EXISTING CONDITIONS:

A. The Electrical Contractor is responsible for visiting and examining the site to determine those portions of the site or present buildings affected by this work so as to become familiar with existing conditions and difficulties that will attend the execution of the work, before submitting proposals.

B. Submission of a proposal will be considered as evidence that such examination has been made and later claims for labor, equipment, or materials because of difficulties encountered, which could have been foreseen had such examination been made, will not be recognized.

3.07 LOCATIONS OF OUTLET BOXES FOR EQUIPMENT AND GENERAL WIRING:

A. All outlets for power and equipment, not specifically dimensioned are located diagrammatically on the drawings.

B. Equipment outlets shall be located so as to serve the equipment directly. It is the Contractor's responsibility to coordinate outlet location with equipment so that all outlets are accessible and disconnect switches have clearance for operation.

3.08 PAINTING:

A. Exposed conduit, ungalvanized troughs, metal frames and support racks and wooden surfaces provided under this section shall be painted. Paint color shall match and be the same paint as the room finish paint unless noted elsewhere on the plans or in the specifications. Clean surfaces completely of all oil, wax, rust and old paint prior to repainting. Paint shall be applied to backup boards before switches, troughs, and devices are installed. Paint shall include a primer and two coats of finished paint. Touch-up scratched, or marred surfaces of lighting fixtures and equipment with paint obtained from the equipment manufacturer especially for that purpose.

3.09 ELECTRICAL SYSTEM TESTING:

A. At the time of the final inspection, or at such times as parts of the system may be completed, all electrical systems shall be tested for compliance with the specifications. The Contractor shall provide all personnel and equipment; current, voltage and resistance measuring

instruments, ladders and lights to assist the Engineer in conducting the tests. Authorized representatives of the manufacturer shall be present to demonstrate compliance with specifications of their specific system.

B. The Contractor shall remove equipment covers as directed for inspection of internal wiring. Accessible ceiling shall be removed as directed for inspection of equipment above the ceilings. After inspection and correction of any problems found, the Contractor shall replace all cover plates, access plates and removable ceiling.

C. The life safety system shall be demonstrated to function in accordance with the specifications. Each device shall be tested for proper operation.

3.10 CLEANING:

A. At completion of the work the Contractor shall clean all exposed elements of the electrical system so that all markings deteriorating the original finish appearance are removed. All lighting fixtures, lenses, and reflectors shall be cleaned inside and out and all lamps shall be left clear of dust, dirt, and grime.

B. The Contractor shall specifically examine the interiors of panelboard cans, equipment cabinets, lighting fixtures, junction boxes, and like components where conduit and wire connections have been made, and all resulting wire ends, insulation cuttings, knock-out plugs, metal filings and any other trash shall be removed so that interiors and exteriors are left free of all debris.

END OF SECTION

SECTION 16060 - GROUNDING AND BONDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding components.

1.02 SYSTEM DESCRIPTION

A. Furnish all labor, materials, services, equipment and appliances required in conjunction with a grounding system as indicated in the Contract Documents.

B. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

1.03 REFERENCE STANDARDS

A. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2007.

B. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

B. Product Data: Provide for grounding electrodes and connections.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cooper Power Systems, a division of Cooper Industries: www.cooperindustries.com.

B. Framatome Connectors International: www.fciconnect.com.

2.02 CONNECTORS AND ACCESSORIES

A. Mechanical Connectors: Bronze.

B. Exothermic Connections:
   1. Substitutions: See Section 01600 - Product Requirements.

C. Wire: Stranded copper.

D. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.02 GENERAL INSTALLATION REQUIREMENTS

A. Ground electrical work in accordance with NEC Article 250, local codes as specified herein, and as shown on the drawings.

B. Provide a separate, insulated equipment grounding conductor in feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing.

C. Install equipment grounding conductors in raceway with feeder conductors.

D. Where connections are made to motors or equipment with flexible metal conduit, grounding conductor shall be stranded copper conductor within the conduit, bonded to the equipment and to the rigid metal raceway system. Size conductor in accordance with NEC Table 250-122 or as shown on the plans.

E. Provide bonding to meet requirements described in Quality Assurance.

F. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.03 FIELD QUALITY CONTROL

A. Provide field inspection in accordance with Section 01400. Inspect grounding and bonding system conductors and connections for tightness and proper installation

3.04 COORDINATION

A. Coordinate the work under this section with the work under other divisions of the specifications.

END OF SECTION

SECTION 16075 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

1.02 RELATED REQUIREMENTS

A. Section 09900 - Paints and Coatings.

B. Section 16123 - Building Wire and Cable: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:
   1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
   2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

a. Switchboards:
1) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
b. Motor Control Centers:
1) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
2. Use identification nameplate to identify disconnect location for equipment with remote disconnecting means.
3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
4. Use identification label or handwritten text using indelible marker on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor, voltage, and phase of motor(s) controlled.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 16123.
2. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
a. At each source and load connection.
b. Within boxes when more than one circuit is present.
c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. Equipment Designation: 1/2 inch.
b. Other Information: 1/4 inch.
5. Color:

a. Normal Power System: White text on black background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 WIRE PHASE MARKING

A. Description: Plastic colored tape or integrally pigmented colored wire.

B. Locations: Each conductor at panelboard gutters, pull boxes, Starters, and outlet boxes and each load or supply connection where a feeder terminates.

C. Legend
1. Feeders and Branch Circuits: Color code for the respective voltage system as described in Section 16123 - Building Wire and Cables.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to

interior surfaces using self-adhesive backing, or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 16097 - ELECTRICAL DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

1.02 RELATED REQUIREMENTS

A. Section 01700 - Execution Requirements: Additional requirements for alterations work.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual sections.

PART 3 EXECUTION

3.01 EXAMINATION

A. All demolition work shall be preformed with due care and diligence so as to prevent the unnecessary destruction and/or damage to sytems that shall remain in operation at the conclusion of the project. Determine the exact location of all existing equipment, devices and wiring before commencing work.

B. Preserve all portions of the existing electrical systems which shall remain.

C. Verify field measurements and circuiting arrangements are as shown on Drawings.

D. Verify that abandoned wiring and equipment serve only abandoned facilities.

E. Demolition drawings are based on casual field observation and existing record documents. Equipment and circuits have been shown in an approximate way and have not been independently verified by the owner or engineer. Determine all work necessary to renovate, alter, change and repair existing sytems based on the actual field conditions.

F. Not all Conduit and wiring is shown on the demolition plan but shall be considered fully a part of the work.

G. Existing conduit and wiring may be re-used where they are of the type specified, meet the requirements for the new work as defined by the Contract Documents and remain in good condition.

H. Existing circuitry without a seperate grounding conductor shall not be re-used.

I. Report discrepancies to Architect before disturbing existing installation.

J. Beginning of demolition means installer accepts existing conditions and agrees to be fully responsible for any and all damages caused by a failure to exactly locate and preserve any and all existing portions of the electrical system.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings to be removed.

B. Coordinate utility service outages with utility company.

C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Remove, relocate, and extend existing installations to accommodate new construction. Maintain the continuity of service and grounding to the existing circuits and other system elements contained within the area of constuction that serve other areas of the facility and conceal them above ceilings and other building elements in the new construction.

B. Remove abandoned wiring to source of supply or to the point on a shared circuit from where the equipment of device is served.

C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.

E. Remove and re-install or protect in place all existing equipment and devices shown to remain on or in walls, ceilings and floors which are exposed to demolition and construction activities and which may be damaged by dust, dirt, debris and painting. Where new walls are extended extend boxes and wiring to accomodate new finish.

F. Replace existing devices shown to remain in operation and and their associated coverplates which have been damaged.

G. Disconnect and remove abandoned panelboards and distribution equipment.

H. Coordinate disconnect and remove electrical devices and equipment serving utilization equipment that has been removed. Examing the demolition plans of all trades provide electrical demolition services for equipment and devices being removed.

I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

J. Provide all cutting and patching to repair any damage caused by construction activities including adjacent construction and finishes damaged during demolition and extension work.

K. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

L. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment that remain or that are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace

damaged circuit breakers and provide closure plates for vacant positions. Provide newly revised typed panelboard directories for existing panelboards to reflect new circuit conditions as a result of construction and demolition.

C. Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts and broken electrical parts.

D. All equipment, devices and materials removed during demolition work and not indicated to be reused or turned over to the owner, shall become the responsibility of the Contractor for disposal.

END OF SECTION

SECTION 16123 - BUILDING WIRE AND CABLE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wire and cable for 600 volts and less.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Wire pulling lubricant.

1.02 RELATED REQUIREMENTS

A. Section 07840 - Firestopping.

B. Section 16060 - Grounding and Bonding: Additional requirements for grounding conductors and grounding connectors.

C. Section 16075 - Electrical Identification: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2001 (Reapproved 2007).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2009).

D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.

E. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes; 2008.

F. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation); Federal Specification; Revision A, 2008.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).

I. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.

J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
3. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. NEMA WC 3 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

C. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures and Section 16010.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower

than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Use stranded conductors for control circuits.

D. Use conductor not smaller than 12 AWG for power and lighting circuits and all other wiring where the voltage is greater than 48 volts.

E. Use conductor not smaller than 16 AWG for control circuits.

F. Conductor sizes are based on copper unless indicated as aluminum or "AL".

2.02 CONDUCTOR AND CABLE MANUFACTURERS

A. Cerro Wire LLC: www.cerrowire.com.

B. Industrial Wire & Cable, Inc: www.iewc.com.

C. Southwire Company: www.southwire.com.

D. Substitutions: See Section 01600 - Product Requirements.

2.03 ALL CONDUCTORS AND CABLES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Comply with FS A-A-59544 where applicable.

F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

H. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.

I. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.

J. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
   a. Exceptions:
      1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
      3) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.
2. Control Circuits: 14 AWG.

K. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
   a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
3. Color Code:
   a. 480Y/277 V, 3 Phase, 4 Wire System:
      1) Phase A: Brown.
      2) Phase B: Orange.
      3) Phase C: Yellow.
      4) Neutral/Grounded: Gray.
   b. 208Y/120 V, 3 Phase, 4 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Phase C: Blue.
      4) Neutral/Grounded: White.
   c. Equipment Ground, All Systems: Green.
   d. Isolated Ground, All Systems: Green with yellow stripe.
   e. Travelers for 3-Way and 4-Way Switching: Pink.
   f. For modifications or additions to existing wiring systems, comply with existing color code when existing code complies with NFPA 70 and is approved by the authority having jurisdiction.
   g. For control circuits, comply with manufacturer's recommended color code.

2.04 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
1. Feeders and Branch Circuits: Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

E. Insulation Voltage Rating: 600 volts.

F. Insulation: NFPA 70, Type THHN/THWN.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

C. Wiring Connectors for Terminations:
   1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
   2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
   3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
   4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
   5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
   6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
   7. Conductors for Control Circuits: Use crimped terminals for all connections.

D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
   1. Manufacturers:
      a. 3M: www.3m.com.
      b. Ideal Industries, Inc: www.idealindustries.com.
      c. NSI Industries LLC: www.nsiindustries.com.

E. Push-in Wire Connectors: Rated 600 V, 221 degrees F.
   1. Manufacturers:
      a. Ideal Industries, Inc: www.idealindustries.com.
      b. NSI Industries LLC: www.nsiindustries.com.
      c. Wago Corporation: www.wago.us.

F. Mechanical Connectors: Provide bolted type or set-screw type.
   1. Manufacturers:
      a. Burndy: www.burndy.com.
      b. Ilsco: www.ilsco.com.

c. Thomas & Betts Corporation: www.tnb.com.

G. Compression Connectors: Provide circumferential type or hex type crimp configuration.
1. Manufacturers:
a. Burndy: www.burndy.com.
b. Ilsco: www.ilsco.com.
c. Thomas & Betts Corporation: www.tnb.com.

H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
a. Burndy: www.burndy.com.
b. Ilsco: www.ilsco.com.
c. Thomas & Betts Corporation: www.tnb.com.

2.06 WIRING ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
a. 3M: www.3m.com.
b. Plymouth Rubber Europa: www.plymouthrubber.com.
c. Substitutions: See Section 01600 - Product Requirements.
2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
a. 3M: www.3m.com.

C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that raceway installation is complete and supported.

E. Verify that field measurements are as shown on the drawings.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange circuiting to minimize splices.
   4. Include circuit lengths required to install connected devices within 10 ft of location shown.
   5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
   6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
   7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are shown as separate, combining them together in a single raceway is not permitted.
   8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
   9. Provide oversized neutral/grounded conductors where indicated and as specified below.
      a. Provide 200 percent rated neutral for feeders fed from K-rated transformers.
      b. Provide 200 percent rated neutral for feeders serving panelboards with 200 percent rated neutral bus.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended

maximum pulling tension and sidewall pressure.

4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.

G. Terminate cables using suitable fittings.

H. Install conductors with a minimum of 12 inches of slack at each outlet.

I. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.

J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

K. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

L. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
    b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
2. Damp Locations: Use insulating covers specifically designed for the connectors,

electrical tape, or heat shrink tubing.

a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

3. Wet Locations: Use heat shrink tubing.

M. Insulate ends of spare conductors using vinyl insulating electrical tape.

N. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

O. Identify conductors and cables in accordance with Section 16075.

P. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

Q. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07840.

R. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

S. Where a circuit home run or a feeder is shown on the plans without any conductor or raceway identification, it shall be a minimum of 2 # 12, 1 # 12 Ground, ½" Conduit unless additional information is available as follows:

1. Where an overcurrent device is shown for the circuit in panelboards or otherwise noted, size the conductor and raceway to match the overcurrent device rating. If the feeder or homerun is shown connected to a transformer, electric motor, mechanical equipment or other equipment for which load information is available on the plans or in the project manual, provide conductors and raceways sized to the load capacity of the equipment. Verify final sizes with the Engineeer in such cases.

T. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

U. Protect exposed cable from damage.

V. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise. Splice or tap only in accessible junction boxes or other electrical enclosures.

W. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

X. Use a power distribution block as manufactured by Ilsco (sized for the size and number of conductors, and splice type) for splices and taps, 6 AWG and larger. Power distribution block shall be installed in a junction box, sized per NEC.

3.04 CONDUCTOR/CABLE IDENTIFICATION

A. Each wire or cable in a feeder at its terminal points, and in each pull box, junction box, and panel gutter through which it passes shall be identified to show the circuit number of the breaker to which it connects. Each common wire, common circuit to common loop of a system, fire alarm, sound system, TV system, or any signal system conductor, shall be identified. Refer to Section 16075 - IDENTIFICATION for additional instructions.

3.05 FIELD QUALITY CONTROL

A. Perform inspection, testing, and adjusting in accordance with Section 01400.

B. Perform field inspection and testing in accordance with Section 01400.

C. Inspect wire and cable for physical damage and proper connection.

D. Torque test conductor connections and terminations to manufacturer's recommended values.

E. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

F. Feeder Resistance Testing:
   1. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500-volt megger. The procedures listed below shall be followed:
   2. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
   3. After all fixtures, devices, and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel until source of the low reading is found. The contractor shall correct troubles, reconnect, and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
   4. Document test by tabulating the readings with time of day, date, temperature and all pertinent test information. Submit documenation to the engieer prior to the final inpsection and as a prerequesite for final acceptance of the project.
   5. At final inspection, the contractor shall furnish a megger and show the engineers and State Construction Office representatives that the panels comply with the above.

G. Inspect and test in accordance with NETA STD ATS, except Section 4.

H. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

I. Correct deficiencies and replace damaged or defective conductors and cables.

J. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION

SECTION 16131 - CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible metal conduit (FMC).

B. Liquidtight flexible metal conduit (LFMC).

C. Electrical metallic tubing (EMT).

D. Conduit fittings.

E. Conduit, fittings and conduit bodies.

1.02 RELATED REQUIREMENTS

A. Section 16060 - Grounding and Bonding.

B. Section 16075 - Electrical Identification.

C. Section 16138 - Boxes.

1.03 RELATED WORK

A. Cutting and Patching.

1.04 DESCRIPTION OF WORK

A. Unless otherwise noted on the drawings or specified elsewhere in Division 16, route all conductors in conduit. The electrical plans indicate the general location of circuiting, electrical devices, and/or outlet boxes. If approved by the Engineer, conduit runs may be modified at the time of construction to adapt to the construction conditions, but in no case shall a circuit be combined with another circuit or modified.

1.05 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC); 2005.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); National Electrical Contractors Association; 2006.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association;

2005.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; National Electrical Manufacturers Association; 2003.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association; 2004.

J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

M. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.06 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittals procedures.

B. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches. Show not only conduit routing but all pull boxes in the raceway system.

1.07 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

D. Protect PVC conduit from sunlight.

PART 2 PRODUCTS

2.01 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.

C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than

applicable minimum size requirements specified.

2.02 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1 [FS WW-C-581].

B. Rigid Aluminum Conduit: ANSI C80.5.

C. Intermediate Metal Conduit (IMC): Rigid steel.

D. Fittings and Conduit Bodies: NEMA FB 1,concrete tight; material to match conduit.
1. All locknuts shall be made of malleable iron or hardened steel, electro zinc plated. Use T&B 140 series, or approved equal.
2. Threaded hubs shall be made of malleable iron or steel, zinc plated and equipped with nylon insulated throat and oil resistant, moisture resistant recessed sealing ring. Hub shall be T&B 370 series, or approved equal.
3. Concrete Tight fittings shall be T&B 8123 series, 8120 series, or approved equal.
4. Where boxes require back to back nippling, use locknuts and nylon bushed nipples, T&B 140 series locknuts and T&B 1942 series nipples, or approved equal. Where conductors pass through field punched, factory punched, or field cut or drilled holes, use nipples and bushings rated for these holes such as T&B #3210 series, or approved equal.
5. Insulated mettalic grounding and bonding bushings: T&B 3870 Series or approved equal.
6. Grounding and bonding adapter locknut: T&B 4001 Series or approved equal.

2.03 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

C. Description: Interlocked steel construction.

D. Fittings: NEMA FB 1. Fittings shall be two-screw, double clamp malleable iron, hot dipped galvanized.

2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

C. Description: Interlocked steel construction with PVC jacket.

D. Fittings: NEMA FB 1.
   1. Fittings shall be of the type that uses a threaded grounding cone, a steel, nylon or plastic compression ring, insulated throat, and a gland for tightening. Fittings shall be made of steel, have insulated throats and have a male thread and locknut or male bushing with a ring seal. Each connector shall provide a low resistance ground connection between the flexible conduit and the outlet box, conduit or other equipment to which it is connected.

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel or malleable iron.
   3. Connectors and Couplings: Use compression (gland) or set-screw type.
      a. Do not use indenter type connectors and couplings.

C. Description: ANSI C80.3 [; galvanized tubing.]

D. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

E. EMT connections shall be made tight to boxes and cabinets using insulated throat ferrous metal fittings specifically designed for use with EMT conduit. Use insulating insert at all joints to prevent any abrasion of wires during installation.

F. For EMT installation encased in concrete, join EMT with moisture proof type fittings so as to be completely sealed against intrusion of moisture.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on drawings.

B. Verify that mounting surfaces are ready to receive conduits.

C. Verify that conditions are satisfactory for installation prior to starting work.

D. Verify routing and termination locations of conduit prior to rough-in.

E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 16070 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Connections and Terminations:
1. Use suitable adapters where required to transition from one type of conduit to another.
2. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
3. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
4. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

E. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07840.

F. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where conduits are subject to earth movement by settlement or frost.

G. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

H. Provide grounding and bonding in accordance with Section 16060.

3.03 CONDUIT SIZES

A. Size conduit for conductor type installed; ½ inch minimum size except all voice and data

conduit shall be minimum 3/4".

B. For all sizes of conduit larger than 1-1/2 inches, use factory elbows, unless otherwise specified herein. In smaller sizes, field bends will be permitted but care must be taken not to damage the conduit. The radius of the inner curve of any bend shall not be less than that permitted by the NEC.

C. Where conduit sizes are not shown on the drawings, provide conduit sizes in accordance with the 2002 National Electric Code and equipment manufacturers' recommendations.

D. Minimum sizes of conduits where size is not shown on the plans shall be as follows:

	Area Of Installation	Minimum Size
a.	Framed walls	½"
b.	Above accessible ceilings	½"
c.	Concealed in floor slabs	3/4"
d.	In grade	3/4"
e.	Cast in concrete	3/4"
f.	Exposed	3/4"
g.	Flexible conduit	½"

3.04 CONDUIT SUPPORTS

A. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

B. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

C. Do not attach conduit to ceiling support wires.

D. Support conduit maximum 5' on center.

3.05 CONDUIT SLEEVES AND OPENINGS THROUGH WATERPROOF WALLS, FLOORS AND MEMBRANES

A. For exterior non-membrane openings, furnish and install cast iron pipe sleeves for conduits passing through non-membrane waterproofed exterior walls, footings, roofs or beams. Sleeves through exterior walls below grade shall have continuously welded center flange buried in construction. Make conduit watertight in sleeve with oakum packing and caulked lead joints on both sides of wall.

B. For interior membrane openings, furnish and install cast iron sleeves passing through interior membrane water proofed floors with integral flashing flange and clamping ring. Adjust sleeves to floor construction with galvanized steel or wrought iron pipe nipples top and bottom, extending two inches above finished floor. Clamp sleeves to flashing with clamping device.

C. For exterior membrane openings, furnish and install cast iron sleeves passing through exterior membrane waterproofed walls, floors and roof with integral flashing flange and clamping ring, modified for the required thickness. Make conduit watertight in sleeve with oakum packing and caulked lead joint.

3.06 CUTTING OF HOLES:

A. All holes through floor slabs shall be cut with a diamond core drill.

END OF SECTION

SECTION 16138 - BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pull and junction boxes.

1.02 RELATED REQUIREMENTS

A. Section 16010 - General Electrical Requirements

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2007.

C. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008.

D. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports; National Electrical Manufacturers Association; 2008.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.

F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Appleton Electric: www.appletonelec.com.

B. Arc-Co./Division of Arcade Technology: www.arc-co.com.

C. Unity Manufacturing: www.unitymfg.com.

D. Substitutions: See Section 01600 - Product Requirements.

2.02 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: For an box with a dimension that exceeds 12 inches and as specified in Section 16139.

C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
   1. Material: Galvanized cast iron.
   2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
   3. UL listed: RAIN TIGHT

PART 3 EXECUTION

3.01 INSTALLATION

A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.

B. Junctions and pull boxes are not generally shown on the plans. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.

C. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches of box.

D. Install plugs, and other inserts to cover all unused conduit openings.

E. Large Pull Boxes: Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

F. Mark all boxes on the outside as to the circuit/system they serve.

3.02 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16155 - EQUIPMENT WIRING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 16131 - Conduit.

B. Section 16123 - Building Wire and Cable.

C. Section 16138 - Boxes.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 COORDINATION

A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

B. Determine connection locations and requirements.

C. Sequence rough-in of electrical connections to coordinate with installation of equipment.

D. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Flexible Conduit: As specified in Section 16131.

B. Wire and Cable: As specified in Section 16123.

C. Boxes: As specified in Section 16138.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

E. Install terminal block jumpers to complete equipment wiring requirements.

F. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION