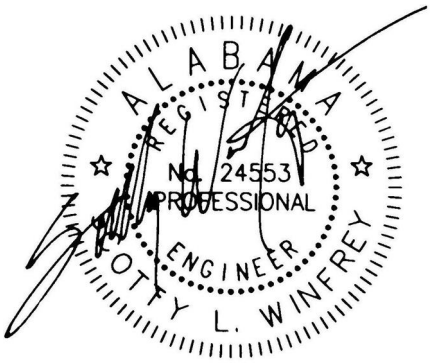
Specifications
For The

Rice/Rivers Hall Chiller/Cooling Tower Replacement

At

The University of North Alabama

Florence, Alabama



5-29-2019

ENGINEERED SOLUTIONS INCORPORATED

CONSULTING ENGINEERS

1813 University Drive NW; Suite 200
Huntsville, Alabama 35801
(256) 533-3482

ESI Project #19002

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PROCUREMENT AND CONTRACTING REQUIREMENTS

ADVERTISEMENT FOR BIDS

Sealed proposals will be received from Qualified General Contractors by the University of North Alabama at the Purchasing Department, Bibb Graves Hall, Room 126, University of North Alabama, Florence, Alabama, 35632 until 2:00 p.m. local time on June 26, 2019 for the UNA Rice and Rivers Hall Chiller and Cooling Tower Replacement, in accordance with Plans and Specification Drawings dated May 29, 2019, prepared by Engineered Solutions Inc., Huntsville AL, and then at said office publicly opened and read aloud. A mandatory pre-bid conference is scheduled for 10:00 a.m. local time at the project site, 728 N Pine St. Florence, AL 35632 on June 19, 2019.

Provided all the bid requirements are met, the Awarding Authority will select the General Contractor that is the lowest and most responsible bidder for the award of the Contract. A Performance Bond and evidence of insurance required in the bid documents will be required at the signing of the Contract.

Bid Documents including Plans and Specifications Drawings may be requested electronically by contacting the UNA Facilities Department 1660 Tune Avenue Florence AL 35630 ph 256-765-6871 or Engineered Solutions, 1813 University Drive NW, Suite 200, Huntsville AL 35801 ph 256-533-3482.

Bids must be submitted on proposal forms furnished by UNA or copies thereof. All bidders bidding in amounts exceeding that established by the State Licensing Board for General Contractors must be licensed under the provisions of Title 34, Chapter 8, Code of Alabama, 1975, and must show evidence of license before bidding or bid will not be received or considered by the University; the bidder shall show such evidence by clearly displaying his or her current license number on the outside of the sealed envelope in which the proposal is delivered.

The Owner reserves the right to reject any or all proposals and to waive technical errors if, in the Owner's judgment, the best interests of the Owner will thereby be promoted.

The University of North Alabama is an EEO/AA employer and any successful bidder will be required to comply with applicable federal and state laws and executive orders.

University of North Alabama
Dr. Kenneth Kitts, PHD
President

University of North Alabama
Office of Procurement
UNA Box 5025
Florence, AL 35632
Phone: (256)765-4206
Fax: (256)765-4329

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INVITATION FOR BIDS:

Sealed Proposals for furnishing materials, equipment or services as described herein will be received at the Purchasing Department, Bibb Graves Hall, Room 126, University of North Alabama, Florence, Alabama, until 2:00 p.m. local time on June 26, 2019.

It is understood that the owner may accept any or all items at the prices listed in this proposal within a noted time frames on the specification page. Time is of the essence to this bid and if delivery is not made within the time specified, the University reserves the right to cancel any order placed as a result of this bid. This bid may be withdrawn at any time prior to the scheduled time for the opening of bids, or any authorized postponement thereof.

DIRECTIONS FOR MAILING BIDS:

Do not place more than one bid in an envelope. Envelopes containing more than one bid may not be opened in time for a bid to be considered.

Envelopes containing bids must be sealed, marked and addressed as follows:

ADDRESSED TO:	(If via any postal service University of North Alabama Purchasing Department - Bid 2019-13 UNA M/S 5025 One Harrison Plaza Florence, AL 35632-0001	(If hand carry) University of North Alabama Purchasing Department - Bid 2019-13 Bibb Graves Hall, Room 126 One Harrison Plaza Florence, AL 35632-0001
BID FOR:	Rice/Rivers Hall Chiller/Cooling Tower Replacement Bid No. 2019-13	

CONTRACTOR LICENSE # _____ (**Contractor License Number must appear on the outside of the envelope**)

CAUTION – The above mailing address line, UNA Box 5025, is the address for the University of North Alabama Central Mail Room and is not part of the physical address for the University of North Alabama Purchasing Department. Envelopes or packages addressed to this box number may not be received in the Purchasing Department by the specified bid due date and time. It is the bidder's responsibility to ensure that the bid is received in the Purchasing Department by the date and time specified; no assumptions should be made in regard to an extension due to unforeseen circumstances of any kind, no due date or time will change without advance written notice from the Procurement Office.

Bidders are strongly cautioned to mail or ship bids to allow ample time for receipt in the Purchasing Department, not the Central Mail Room nor Central Receiving. Overnight or next day delivery services may not be adequate. Since bids must be received in a sealed envelope, faxed or emailed bid copies cannot be accepted.

Bids received in the Purchasing Department after the specified date and time set forth above will not be considered

Bids will be opened in Bibb Graves Hall, Room 126 at 2:00 p.m. local time on June 26, 2019.

Revised 1/30/08

____ initial
I have read and understand the contents of this page

University of North Alabama
Office of Procurement
UNA Box 5025
Florence, AL 35632
Phone: (256)765-4206
Fax: (256)765-4329

INSTRUCTIONS TO BIDDERS

1. All bidders are to submit bids on proposal forms furnished by the Assistant Vice President of Business Services, University of North Alabama (forms enclosed). All bid forms are to be signed in all designated spaces by an authorized officer or employee of the bidder. Telephone bids will not be accepted. Bids submitted by "fax" machine will not be accepted. All bids are to be mailed or delivered in a sealed envelope.

2. All bidders shall base their proposals on the exact schedule of equipment, material or service specifications herein.

3. Pictures, descriptions, and specifications should accompany all bids when required or desirable. Samples may be required and, if so, shall be furnished free of cost to the Owner.

4. Reference to manufacturers, suppliers, catalog numbers, etc., is intended to set quality standards and does not preclude bids from others as long as quality standards are met. Offers of equal items shall state the brand and number or level of quality. Alternates will not be considered unless they conform to the specifications.

5. All bidders are required to submit unit prices and extended prices, where applicable, for each item bid. Where the unit price and the extended total price do not agree, the unit price shall prevail.

6. The Owner reserves the right to accept any or all items on any bidder's proposal at the unit price submitted. The Owner reserves the right to reject any and all bids and to waive informalities.

7. Bidders should sign & return all pages of the complete bid to imply complete understanding and compliance with all bid requirements.

8. All questions related to the bid submission should be directed to the Purchasing Office, University of North Alabama, UNA Box 5025, Florence, AL 35632-0001, phone 256/765-4206.

9. Should a bidder find discrepancies in, or omissions from the bid documents or should he be in doubt as to their meaning, he should at once notify the Owner who will send written instructions to all bidders.

10. Bids received after the bid opening date and time, or any authorized postponement thereof, will not be considered.

11. **A performance bond is required for this project and must be supplied along with the executed contract once an award is made.**

12. **EQUAL EMPLOYMENT OPPORTUNITY/U.S. FAIR LABOR STANDARDS ACT:** By signing this proposal, bidder certifies that bidder is in compliance with the nondiscrimination clause contained in Section 202, Executive Order 11246, as amended by Executive Order 11375, relative to Equal Employment Opportunity for all persons without regard to race, color, religion, sex, or national origin, and the rules and regulations prescribed by the Secretary of Labor, Veteran's Act 38USC4212, Section 503 - Rehabilitation act of 1973 Title I of the Americans with Disabilities Act of 1990 42USC12101, and that any and all goods were produced in compliance with all applicable requirements of Sections 6, 7, and 12 of the Fair Labor Standards Act, as amended, and of regulations and orders of the United States Department of Labor issued under Section 14 thereof.

13. Verbal communication before or while Bid is open shall have no force or affect whatsoever toward this bid as written, or the entire agreement. All parties represent that no promises, representations, or inducements have been made with respect to the subject matter of the bid nor a contract, except as specifically set forth herein. The bid or final contract, agreement, or order, can only be changed, altered, modified or amended by written agreement from both parties.

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PROPOSAL FORM

In compliance with the University of North Alabama **INVITATION FOR BIDS** and **INSTRUCTIONS TO BIDDERS**, the undersigned hereby proposes to furnish and supply items to the University of North Alabama, Florence, Alabama, in strict accordance with the **SCHEDULE** and **SPECIFICATIONS**.

The undersigned bidder/proposer hereby certifies that it, its officers, partners, owners, providers, representatives, employees, and parties in interest, including the affiant, has not in any way colluded, conspired, connived or agreed, directly or indirectly, with any other bidder/proposer, potential bidder/proposer, firm or person, in connection with this solicitation, to submit a collusive or sham bid/proposal, to refrain from bidding/proposing, to manipulate or ascertain the price(s) of other bidders/proposers or potential bidders/proposers, or to secure through any unlawful act an advantage over other bidders/proposers or the university.

The prices submitted herein have been arrived at in an entirely independent and lawful manner by the bidder/proposer without consultation with other bidders/proposers or potential bidders/proposers or foreknowledge of the prices to be submitted in response to this solicitation by other bidders/proposers or potential bidders/proposers on the part of the bidder/proposer, its officers, partners, owners, providers, representatives, employees, or parties in interest, including the affiant.

DATED:_____

COMPANY NAME:_____

BY:_____
(Signature)

_____
(Typed or Printed Name)

_____
(Title)

BUSINESS ADDRESS:_____

_____

_____

TELEPHONE:_____

Email Address:_____
This address will be used to publish the bid tabulation & any other communication regarding bid results

If Bidder is a Corporation, write the State of Incorporation, and if a Partnership, give full name of partners, using space below.

____ initial
I have read and understand the contents of this page

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==========

UNIVERSITY OF NORTH ALABAMA
VENDOR CERTIFICATION
PURSUANT TO ACT NO 2012-491 & ACT2014-044

ALABAMA LAW (SECTION 31-13-9 , CODE OF ALABAMA 1975: By signing a contract resulting from this proposal, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the state of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

ALABAMA LAW SECTION 16-25-26C , CODE OF ALABAMA 1975; Legislation requiring the University of North Alabama to report to Retirement Systems of Alabama individuals paid for personal services who are currently receiving benefits from TRSA or ESA became effective October 1, 2013. No minimum level of compensation was defined. **Any individual receiving direct or indirect compensation from this contract who is a retiree receiving benefits from the State of Alabama Retirement System MUST NOTIFY UNA of this status along with Bid/RFP Submission.**

Bidder hereby certifies full compliance with Act No. 2012-491 & Act No. 2014-044:

Date: _____

Company:_____

Authorizing Signature: _____

Printed Name: _____

Title: _____

State** of* _____County** of* _____

____ initial
I have read and understand the contents of this page

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Office of Procurement
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==========

CERTIFICATE OF COMPLIANCE WITH THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 2011-535, as amended by Act 2012-491)

DATE:_____ RE: Contract/Grant/ Incentive ***(describe by number or subject):***

BID/RFP_____by and between

_____(Contractor/Grantee) and

_____(State Agency, Department or Public Entity)

The undersigned hereby certifies to the State of Alabama as follows:

1. The undersigned holds the position of with the Contractor/Grantee named above, and is authorized to provide representations set out in this Certificate as the official and binding act of that entity, and has knowledge of the provisions of THE BEASON-HAMMON ALABAMA TAXPAYER AND CITIZEN PROTECTION ACT (ACT 201 1-535 of the Alabama Legislature, as amended by Act 2012-491) which is described herein as "the Act".
2. Using the following definitions from Section 3 of the Act, select and initial either (a) or (b), below, to describe the Contractor/Grantee's business structure. BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit. "Business entity" shall include, but not be limited to the following:
   a) Self-employed individuals, business entities filing articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign limited liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.
   b) Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license, and any business entity that is operating unlawfully without a business license.

EMPLOYER.: Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer.
This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

____(a) The Contractor/Grantee is a business entity or employer as those terms are defined in Section 3 of the Act.

____(b) The Contractor/Grantee is not a business entity or employer as those terms are defined in Section **3** of the Act.

3. As of the date of this Certificate, Contractor/Grantee does not knowingly employ an unauthorized alien within the State of Alabama and hereafter it will not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama;
4. Contractor/Grantee is enrolled in E-Verify unless it is not eligible to enroll because of the rules of that program or other factors beyond its control.

Certified this____ day of_____ 20_____. _____
Name of Contractor/Grantee/Recipient

By:_____

Its:_____

The above Certification was signed in my presence by the person whose name appears above, on this_____ day of _____20____.

WITNESS:_____ *Printed name of Witness:* _____

____ initial
I have read and understand the contents of this page

University of North Alabama
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UNA Box 5025
Florence, AL 35632
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State of Alabama

Disclosure Statement

(Required by Act 2001-955)

ENTITY COMPLETING FORM Agreement Number

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER ( )

STATE AGENCY/DEPARTMENT THAT WILL RECEIVE GOODS, SERVICES, OR IS RESPONSIBLE FOR GRANT AWARD

ADDRESS

CITY, STATE, ZIP TELEPHONE NUMBER ( )

This form is provided with:

☐ Contract ☐ Proposal ☐ Request for Proposal ☐ Invitation to Bid ☐ Grant Proposal

Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify below the State Agency/Department that received the goods or services, the type(s) of good or services previously provided, and the amount received for the provision of such goods or services.

Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify the State Agency/Department that awarded the grant, the date such grant was awarded, and the amount of the grant.

1. List below the name(s) and address(es) of all public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

2. List below the name(s) and address(es) of all family members of public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from

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the proposed transaction. Identify the public officials/public employees and State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

If you identified individuals in items one and/or two above, describe in detail below the direct financial benefit to be gained by the public officials, public employees, and/or their family members as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

Describe in detail below any indirect financial benefits to be gained by any public official, public employee, and/or family members of the public official or public employee as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

List below the name(s) and address(es) of all paid consultants and/or lobbyists utilized to obtain the contract, proposal, request for proposal, invitation to bid, or grant proposal:

By signing below, I certify under oath and penalty of perjury that all statements on or attached to this form are true and correct to the best of my knowledge. I further understand that a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00, is applied for knowingly providing incorrect or misleading information.

Signature Date

Notary's Signature Date Date Notary Expires

Act 2001-995 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000.

____ initial
I have read and understand the contents of this page

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This form must be completed and returned before any contract(s) will be issued by the University of North Alabama

REQUIREMENTS/ SPECIFICATIONS

The University of North Alabama is seeking bids for the demoliton of existing piping and equipment, installation of a 400 ton water-cooled chiller, installation of a cooling tower (including concrete support pad), installation of associated pumps and associated mechanical and electrical equipment, piping, wiring/controls, and assessories located at the Rice/Rivers Hall building on the UNA campus.

The attached demolition and installation drawings detail the required scope of work for this project. The mechanical/electrical contractor performing the work shall provide all materials and equipment (other than owner furnished equipment) and perform all labor required to demo, install, test, and balance a complete and operable mechanical system as indicated on the drawings and specifications. Submittal information should be presented to the engineer of record for approval prior to ordering of equipment.

After job completion, provide installation and operations documentation (cutsheets, manuals, warranties, etc.) to the owner for all equipment and accessories (i.e. pumps, expansion tank, shot feeder, valves, actuators, guages, sensors, controls, variable frequency drives, etc.).

Item 1. Install owner furnished mechanical equipment according to the Rice/Rivers Hall Chiller/Cooling Tower Replacement bid package dated 5/29/2019 by Engineered Solutions Incorporated.

Base Bid Price: $_____

****

FOB UNIVERSITY OF NORTH ALABAMA, FLORENCE, AL 35632-0001

For any technical, questions concerning drawings, equipment, or access to the site
Contact Kevin Hudson (256)765-6871; email kchudson@una.edu
For questions regarding bid submission
Contact the Office of Procurement, Cindy Conlon (256)765-4293; email chconlon@una.edu

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I have read and understand the contents of this page

INSTRUCTIONS TO BIDDERS

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1. Bid Documents
2. General Contractor's State Licensing Requirements
3. Qualifications of Bidders and Prequalification Procedures
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15. Determination of Low Bidder by Use of Alternates
16. Unit Prices
17. Award of Contract

1. BID DOCUMENTS

The Bid Documents consist of the Advertisement for Bids, these Instructions to Bidders, any modifications of or supplements to these Instructions to Bidders, the Proposal Form, and the proposed Contract Documents. The proposed Contract Documents consist of the Construction Contract, the Performance Bond and Payment Bond, the Conditions of the Contract (General, Supplemental, and other Conditions), Drawings, Specifications and all addenda issued prior to execution of the Construction Contract. Bid Documents may be obtained or examined as set forth in the Advertisement for Bids.

2. GENERAL CONTRACTOR'S STATE LICENSING REQUIREMENTS:

When the amount bid for a contract exceeds $50,000, the bidder must be licensed by the State Licensing Board for General Contractors and must show the Architect evidence of license before bidding or the bid will not be received by the Architect or considered by the Awarding Authority. A bid exceeding the bid limit stipulated in the bidder's license, or which is for work outside of the type or types of work stipulated in the bidder's license, will not be considered. In case of a joint venture of two or more contractors, the amount of the bid shall be within the maximum bid limitation as set by the State Licensing Board for General Contractors of the combined limitations of the partners to the joint venture.

3. QUALIFICATIONS of BIDDERS and PREQUALIFICATION PROCEDURES:

a. Any special qualifications required of general contractors, subcontractors, material suppliers, or fabricators are set forth in the Bid Documents.

b. The Awarding Authority may have elected to prequalify bidders. Parties interested in bidding for this contract are directed to the Advertisement for Bids and Supplemental Instructions to Bidders to determine whether bidders must be prequalified and how they may obtain copies of the Awarding Authority's published prequalification procedures and criteria.

c. Release of Bid Documents by the Architect to a prospective bidder will not constitute any determination by the Awarding Authority or Architect that the bidder has been found to be qualified, prequalified, or responsible.

4. PREFERENCE to RESIDENT CONTRACTORS:
(If this project is federally funded in whole or in part, this Article shall not apply.)

a. In awarding the Contract, preference will be given to Alabama resident contractors and a nonresident bidder domiciled in a state having laws granting preference to local contractors shall be awarded the Contract only on the same basis as the nonresident bidder's state awards contracts to Alabama contractors bidding under similar circumstances.

b. A nonresident bidder is a contractor which is neither organized and existing under the laws of the State of Alabama, nor maintains its principal place of business in the State of Alabama. A nonresident contractor which has maintained a permanent office within the State of Alabama for at least five continuous years shall not thereafter be deemed to be a non-resident contractor so long as the contractor continues to maintain a branch office within Alabama.

5. EXAMINATION of BID DOCUMENTS and the SITE of the WORK :

Before submitting a bid for the Work, the bidders shall carefully examine the Bid Documents, visit the site, and satisfy themselves as to the nature and location of the Work, and the general and local conditions, including weather, the general character of the site or building, the character and extent of existing work within or adjacent to the site and any other work being performed thereon at the time of submission of their bids. They shall obtain full knowledge as to transportation, disposal, handling, and storage of materials, availability of water, electric power, and all other facilities in the area which will have a bearing on the performance of the Work for which they submit their bids. The submission of a bid shall constitute a representation by the bidder that the bidder has made such examination and visit and has judged for and satisfied himself or herself as to conditions to be encountered regarding the character, difficulties, quality, and quantities of work to be performed and the material and equipment to be furnished, and as to the contract requirements involved.

6. EXPLANATIONS and INTERPRETATIONS:

a. Should any bidder observe any ambiguity, discrepancy, omission, or error in the drawings and specifications, or in any other bid document, or be in doubt as to the intention and meaning of these documents, the bidder should immediately report such to the Architect and request clarification.

b. Clarification will be made only by written Addenda sent to all prospective bidders. Neither the Architect nor the Awarding Authority will be responsible in any manner for verbal answers or instructions regarding intent or meaning of the Bid Documents.

c. In the case of inconsistency between drawings and specifications or within either document, a bidder will be deemed to have included in its bid the better quality or greater quantity of the work involved unless the bidder asked for and obtained the Architect's written clarification of the requirements before submission of a bid.

7. SUBSTITUTIONS

a. The identification of any product, material, system, item of equipment, or service in the Bid Documents by reference to a trade name, manufacturer's name, model number, etc. (hereinafter referred to as "source"), is intended to establish a required standard of performance, design, and quality and is not intended to limit competition unless the provisions of paragraph "d" below apply.

b. When the Bid Documents identify only one or two sources, or three or more sources followed by "or approved equal" or similar wording, the bidder's proposal may be based on a source not identified but considered by the bidder to be equal to the standard of performance, design and quality as specified; however, such substitutions must ultimately be approved by the Architect. If the bidder elects to bid on a substitution without "Pre-bid Approval" as described below, then it will be understood that proof of compliance with specified requirements is the exclusive responsibility of the bidder.

c. When the Bid Documents identify three or more sources and the list of sources is not followed by "or approved equal" or similar wording, the bidder's proposal shall be based upon one of the identified sources, unless the bidder obtains "Pre-bid Approval" of another source as described below. Under these conditions it will be expressly understood that no product, material, system, item of equipment, or service that is not identified in the Bid Documents or granted "Pre-Bid Approval" will be incorporated into the Work unless such substitution is authorized and agreed upon through a Contract Change Order.

d. If the Bid Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the bidder's proposal must be based upon the identified sole source.

e. Procedures for "Pre-bid Approval". If it is desired that a product, material, system, piece of equipment, or service from a source different from those sources identified in the Bid Documents be approved as an acceptable source, application for the approval of such source must reach the hands of the Architect at least ten days prior to the date set for the opening of bids. At the Architect's discretion, this ten day provision may be waived. The application for approval of a proposed source must be accompanied by technical data which the applicant desires to submit in support of the application. The Architect will give consideration to reports from reputable independent testing laboratories, verified experience records showing the reputation of the proposed source with previous users, evidence of reputation of the source for prompt delivery, evidence of reputation of the source for efficiency in servicing its products, or any other pertinent written information. The application to the Architect for approval of a proposed source must be accompanied by a schedule setting forth in which respects the materials or equipment submitted for consideration differ from the materials or equipment designated in the Bid Documents. The burden of proof of the merit of the proposed substitution is upon the proposer. To be approved, a proposed source must also meet or exceed all express requirements of the Bid Documents. Approval, if granted, shall not be effective until published by the Architect in an addendum to the Bid Documents.

8. PREPARATION and DELIVERY of BIDS:

a. Proposal Form:

(1) Bids must be submitted on the Proposal Form as contained in the Bid Documents; only one copy is required to be submitted.

(2) All information requested of the bidder on the Proposal Form must be filled in. The form must be completed by typewriter or hand-printed in ink.

(3) Identification of Bidder: On the first page of the Proposal Form the bidder must be fully identified by completing the spaces provided for:

- **(a)** the legal name of the bidder,
- **(b)** the state under which laws the bidder's business is organized and existing,
- **(c)** the city (and state) in which the bidder has its principal offices,
- **(d)** the bidder's business organization, i.e., corporation, partnership, or individual (to be indicated by marking the applicable box and writing in the type of organization if it is not one of those listed), and
- **(e)** the partners or officers of the bidder's organization, if the bidder is other than an individual. If the space provided on the Proposal Form is not adequate for this listing, the bidder may insert "See Attachment" in this space and provide the listing on an attachment to the Proposal Form.

(4) Where indicated by the format of the Proposal Form, the bidder must specify lump sum prices in both words and figures. In case of discrepancy between the prices shown in words and in figures, the words will govern.

(5) All bid items requested in the Proposal Form, including alternate bid prices and unit prices for separate items of the Work, must be bid. If a gross sum of bid items is requested in the Proposal Form, the gross sum shall be provided by the bidder.

(6) In the space provided in the Proposal Form under "Bidder's Alabama License", the bidder must insert his or her current general contractor's state license number, current bid limit, and type(s) of work for which bidder is licensed.

(7) The Proposal Form shall be properly signed by the bidder. If the bidder is:

- **(a)** **an individual**, that individual or his or her "authorized representative" must sign the Proposal Form;
- **(b)** **a partnership,** the Proposal Form must be signed by one of the partners or an "authorized representative" of the Partnership;
- **(c)** **a corporation,** the president, vice-president, secretary, or "authorized representative" of the corporation shall sign and affix the corporate seal to the Proposal Form.

As used in these Instructions to Bidders, "authorized representative" is defined as a person to whom the bidder has granted written authority to conduct business in the bidder's behalf by signing and/or modifying the bid. Such written authority shall be

signed by the bidder (the individual proprietor, or a member of the Partnership, or an officer of the Corporation) and shall be attached to the Proposal Form.

(8) Interlineation, alterations or erasures on the Proposal Form must be initialed by the bidder or its "authorized representative".

b. Bid Guaranty

(1) The Proposal Form must be accompanied by a cashier's check, drawn on an Alabama bank, or a Bid Bond, executed by a surety company duly authorized and qualified to make such bonds in the State of Alabama, payable to the Awarding Authority.

(2) If a Bid Bond is provided in lieu of a cashier's check, the bond shall be on the Bid Bond form as stipulated in the Bid Documents.

(3) The amount of the cashier's check or Bid Bond shall not be less than five percent of the contractor's bid, but is not required to be in an amount more than ten thousand dollars.

c. Delivery of Bids:

(1) Bids will be received until the time set, and at the location designated, in the Advertisement for Bids unless notice is given of postponement. Any bid not received prior to the time set for opening bids will be rejected absent extenuating circumstances and such bids shall be rejected in all cases where received after other bids are opened.

(2) Each bid shall be placed, together with the bid guaranty, in a sealed envelope. On the outside of the envelope the bidder shall write in large letters "Proposal", below which the bidder shall identify the Project and the Work bid on, the name of the bidder, and the bidder's current general contractor's state license number.

(3) Bids may be delivered in person, or by mail if ample time is allowed for delivery. When sent by mail, the sealed envelope containing the bid, marked as indicated above, shall be enclosed in another envelope for mailing.

9. WITHDRAWAL or REVISION of BIDS:

a. A bid may be withdrawn prior to the time set for opening of bids, provided a written request, executed by the bidder or the bidder's "authorized representative", is filed with the Architect prior to that time. The bid will then be returned to the bidder unopened.

b. A bid which has been sealed in its delivery envelope may be revised by writing the change in price on the outside of the delivery envelope over the signature of the bidder or the bidder's "authorized representative". In revising the bid in this manner, the bidder must only write the amount of the change in price on the envelope **and must not reveal the bid price.**

c. Written communications, signed by the bidder or its "authorized representative", to revise bids will be accepted if received by the Architect prior to the time set for opening bids. The Architect will record the instructed revision upon opening the bid. Such written communication

may be by facsimile if so stipulated in Supplemental Instructions to Bidders. In revising the bid in this manner, the bidder must only write the amount of the change in price **and must not reveal the bid price.**

d. Except as provided in Article 12 of these Instructions to Bidders, no bid shall be withdrawn, modified, or corrected after the time set for opening bids.

10. OPENING of BIDS:

Bids will be opened and read publicly at the time and place indicated in the Advertisement for Bids. Bidders or their authorized representatives are invited to be present.

11. INCOMPLETE and IRREGULAR BIDS:

A bid that is not accompanied by data required by the Bid Documents, or a bid which is in any way incomplete, may be rejected. Any bid which contains any uninitialed alterations or erasures, or any bid which contains any additions, alternate bids, or conditions not called for, or any other irregularities of any kind, will be subject to rejection.

12. BID ERRORS

a. Errors and Discrepancies in the Proposal Form. In case of error in the extension of prices in bids, the unit price will govern. In case of discrepancy between the prices shown in the figures and in words, the words will govern.

b. Mistakes within the Bid. If the low bidder discovers a mistake in its bid, the low bidder may seek withdrawal of its bid without forfeiture of its bid guaranty under the following conditions:

(1) Timely Notice: The low bidder must notify the Awarding Authority and Architect in writing, within three working days after the opening of bids, that a mistake was made. This notice must be given within this time frame whether or not award has been made.

(2) Substantial Mistake: The mistake must be of such significance as to render the bid price substantially out of proportion to the other bid prices.

(3) Type of Mistake: The mistake must be due to calculation or clerical error, an inadvertent omission, or a typographical error which results in an erroneous sum. A mistake of law, judgment, or opinion shall not constitute a valid ground for withdrawal without forfeiture.

(4) Documentary Evidence: Clear and convincing documentary evidence of the mistake must be presented to the Awarding Authority and the Architect as soon as possible, but no later than three working days after the opening of bids.

The Awarding Authority's decision regarding a low bidder's request to withdraw its bid without penalty shall be made within 10 days after receipt of the bidder's evidence or by the next regular meeting of the Awarding Authority. Upon withdrawal of bid without

penalty, the low bidder shall be prohibited from (1) doing work on the project as a subcontractor or in any other capacity and (2) bidding on the same project if it is re-bid.

13. DISQUALIFICATION of BIDDERS:

Any bidder(s) may be disqualified from consideration for contract award for the following reasons:

a. Collusion. Any agreement or collusion among bidders or prospective bidders in restraint of freedom of competition to bid at a fixed price or to refrain from bidding or otherwise shall render the bids void and shall cause the bidders or prospective bidders participating in such agreement or collusion to be disqualified from submitting further bids to the Awarding Authority on future lettings. (See § 39-2-6, Code of Alabama 1975, for possible criminal sanctions.)

b. Advance Disclosure. Any disclosure in advance of the terms of a bid submitted in response to an Advertisement for Bids shall render the proceedings void and require re-advertisement and rebid.

c. Failure to Settle Other Contracts. The Awarding Authority may reject a bid from a bidder who has not paid, or satisfactorily settled, all bills due for labor and material on other contracts in force at the time of letting.

14. CONSIDERATION of BIDS:

a. After the bids are opened and read publicly, the bid prices will be compared and the results of this comparison will be available to the public. Until the final award of the contract, however, the Awarding Authority shall have the right to reject any or all bids, and it shall have the right to waive technical errors and irregularities if, in its judgment, the bidder will not have obtained a competitive advantage and the best interests of the Awarding Authority will be promoted.

b. If the Bid Documents request bids for projects or parts of projects in combination or separately, the Bid Documents must include modifications of, or supplements to, these Instructions to Bidders setting forth applicable bid procedures. Award or awards will be made to the lowest responsible and responsive bidder or bidders in accordance with such bid procedures.

15. DETERMINATION of LOW BIDDER by USE of ALTERNATES

a. The Awarding Authority may request alternate bid prices (alternates) to facilitate either reducing the base bid to an amount within the funds available for the project or adding items to the base bid within the funds available for the project. Alternates, if any, are listed in the Proposal Form in the order in which they shall cumulatively deduct from or add to the base bid for determining the lowest bidder.

b. If alternates are included in the Proposal Form, the Awarding Authority shall determine the dollar amount of funds available and immediately prior to the opening of bids shall announce publicly the funds available for the project. The dollar amount of such funds shall be used to determine the lowest bidder as provided herein below, notwithstanding that the actual funds available for the project may subsequently be determined to be more or less than the expected funds available as determined immediately prior to the time of the opening of bids.

c. If the base bid of the lowest bidder exceeds the funds available and alternate bid prices will reduce the base bids to an amount that is within the funds available, the lowest bidder will be determined by considering, in order, the fewest number of the alternates that produces a price within the funds available. If the base bid of the lowest bidder is within the funds available and alternate bid prices will permit adding items to the base bid, the lowest bidder will be determined by considering, in order, the greatest number of the alternates that produces a price within the funds available.

d. After the lowest bidder has been determined as set forth above, the Awarding Authority may award that bidder any combination of alternates, provided said bidder is also the low bidder when only the Base Bid and such combination of alternates are considered.

16. UNIT PRICES:

a. Work Bid on a Unit Price Basis. Where all, or part(s), of the planned Work is bid on a unit price basis, both the unit prices and the extensions of the unit prices constitute a basis of determining the lowest responsible and responsive bidder. In cases of error in the extension of prices of bids, the unit price will govern. A bid may be rejected if any of the unit prices are obviously unbalanced or non-competitive.

b. Unit Prices for Application to Change Orders. As a means of predetermining unit costs for changes in certain elements of the Work, the Bid Documents may require that the bidders furnish unit prices for those items in the Proposal Form. Unit prices for application to changes in the work are not a basis for determining the lowest bidder. Non-competitive unit prices proposed by the successful bidder may be rejected and competitive prices negotiated by the Awarding Authority prior to contract award. Unit prices for application to changes in the work are not effective unless specifically included and agreed upon in the Construction Contract.

17. AWARD of CONTRACT:

a. The contract shall be awarded to the lowest responsible and responsive bidder unless the Awarding Authority finds that all the bids are unreasonable or that it is not in the best interest of the Awarding Authority to accept any of the bids. A responsible bidder is one who, among other qualities determined necessary for performance, is competent, experienced, and financially able to perform the contract. A responsive bidder is one who submits a bid that complies with the terms and conditions of the Advertisement for Bids and the Bid Documents. Minor irregularities in the bid shall not defeat responsiveness.

b. A bidder to whom award is made will be notified by telegram, confirmed facsimile, or letter to the address shown on the Proposal Form at the earliest possible date. Unless other

time frames are stipulated in Supplemental Instructions to Bidders, the maximum time frames allowed for each step of the process between the opening of bids and the issuance of an order to proceed with the work shall be as follows:

(1)	Award of contract by Awarding Authority	30 calendar days after the opening of bids
(2)	Contractor's return of the fully executed contract, with bonds and evidence of insurance, to the Awarding Authority	15 calendar days after the contract has been presented to the contractor for signature
(3)	Awarding Authority's approval of the contractor's bonds and evidence of insurance and completion of contract execution	20 calendar days after the contractor presents complete and acceptable documents to the Architect
(4)	Notice To Proceed issued to the contractor	15 calendar days after final execution of contract by the Awarding Authority, and by the Governor if his or her signature on the contract is required by law

The time frames stated above, or as otherwise specified in the Bid Documents, may be extended by written agreement between the parties. Failure by the Awarding Authority to comply with the time frames stated above or stipulated in Supplemental Instructions to Bidders, or agreed extensions thereof, shall be just cause for the withdrawal of the contractor's bid and contract without forfeiture of bid security.

c. Should the successful bidder or bidders to whom the contract is awarded fail to execute the Construction Contract and furnish acceptable Performance and Payment Bonds and satisfactory evidence of insurance within the specified period, the Awarding Authority shall retain from the bid guaranty, if it is a cashier's check, or recover from the principal or the sureties, if the guaranty is a bid bond, the difference between the amount of the contract as awarded and the amount of the bid of the next lowest responsible and responsive bidder, but not more than $10,000. If no other bids are received, the full amount of the bid guaranty shall be so retained or recovered as liquidated damages for such default. Any sums so retained or recovered shall be the property of the Awarding Authority.

d. All bid guaranties, except those of the three lowest bona fide bidders, will be returned immediately after bids have been checked, tabulated, and the relation of the bids established. The bid guaranties of the three lowest bidders will be returned as soon as the contract bonds and the contract of the successful bidder have been properly executed and approved. When the award is deferred for a period of time longer than 15 days after the opening of the bids, all bid guaranties, except those of the potentially successful bidders, shall be returned. If no award is made within the specified period, as it may by agreement be extended, all bids will be rejected, and all guaranties returned. If any potentially successful bidder agrees in writing to a stipulated extension in time for consideration of its bid and its bid was guaranteed with a cashier's check, the Awarding Authority may permit the potentially successful bidder to substitute a satisfactory bid bond for the cashier's check.

END of INSTRUCTIONS TO BIDDERS

ACCOUNTING OF SALES TAX
Attachment to ABC Form C-3
Proposal Form

To: _____ Date: _____
(Awarding Authority)

NAME OF PROJECT: _____

_____

SALES TAX ACCOUNTING

Pursuant to Act 2013-205, Section 1(g) the Contractor accounts for the sales tax NOT included in the bid proposal form as follows:

		ESTIMATED SALES TAX AMOUNT
BASE BID:		$ _____
Alternate No. 1 (. . . . . .) (Insert Key Word for Alternate)	(add)(deduct)	$ _____
Alternate No. 2 (. . . . . .)	(add)(deduct)	$ _____
Alternate No. 3 (. . . . . .)	(add)(deduct)	$ _____
Alternate No. 4 (. . . . . .)	(add)(deduct)	$ _____
Alternate No. 5 (. . . . . .)	(add)(deduct)	$ _____
Alternate No. 6 (. . . . . .)	(add)(deduct)	$ _____

Failure to provide an accounting of sales tax shall render the bid non-responsive. Other than determining responsiveness, sales tax accounting shall not affect the bid pricing nor be considered in the determination of the lowest responsible and responsive bidder.

Legal Name of Bidder _____

Mailing Address _____

*** By (Legal Signature)** _____

*Name (type or print) _____ *(Seal)*

* Title _____

Telephone Number _____

Numbers in margin correspond to "Checklist", ABC Form B-7

(1)

BC Project No.

CONSTRUCTION CONTRACT

(2) This Construction Contract is entered into this day of in the year of
(3) between the **OWNER(s),**

(4) and the **CONTRACTOR,**

(5) for the **WORK** of the Project, identified as:

(6) The **CONTRACT DOCUMENTS** are dated and have been amended by
(7) **ADDENDA**

(8) The **ARCHITECT** is

(9) The **CONTRACT SUM** is Dollars
($) and is the sum of the Contractor's Base Bid for the Work and the following
(10) **BID ALTERNATE PRICES:**

(11) The **CONTRACT TIME** is ( ) calendar days.

THE OWNER AND THE CONTRACTOR AGREE AS FOLLOWS:

The Contract Documents, as defined in the General Conditions of the Contract (ABC Form C-8), are incorporated herein by reference. The Contractor shall perform the Work in accordance with the Contract Documents. The Owner will pay and the Contractor will accept as full compensation for such performance of the Work, the Contract Sum subject to additions and deductions (including liquidated damages) as provided in the Contract Documents. The Work shall be commenced on a date to be specified in a Notice to Proceed issued by the Owner or the Director, Technical Staff, Alabama Building Commission, and shall then be substantially completed within the Contract Time.

(12) **LIQUIDATED DAMAGES** for which the Contractor and its Surety (if any) shall be liable and may be required to pay the Owner in accordance with the Contract Documents shall be equal to six percent interest per annum on the total Contract Sum unless a dollar amount is stipulated in the following space, in which case liquidated damages shall be determined at _____ dollars ($_____) per calendar day.

Numbers in margin correspond to "Checklist", ABC Form B-7

(13) **SPECIAL PROVISIONS** *(Special Provisions may be inserted here, such as Acceptance or Rejection of Unit Prices.)*

(14) **STATE GENERAL CONTRACTOR'S LICENSE:** The Contractor does hereby certify that Contractor is currently licensed by the Alabama State Licensing Board for General Contractors and that the certificate for such license bears the following:

License No. Bid Limit: Classification:

The Owner and Contractor have entered into this Construction Contract as of the date first written above and have executed this Construction Contract in sufficient counterparts to enable each contracting party to have an originally executed Construction Contract each of which shall, without proof or accounting for the other counterparts, be deemed an original thereof.

The Owner does hereby certify that this Construction Contract was let in accordance with the provisions of Title 39, Code of Alabama 1975, as amended, and all other applicable provisions of law, and that the terms and commitments of this Construction Contract do not constitute a debt of the State of Alabama in violation of Article 11, Section 213 of the Constitution of Alabama, 1901, as amended by Amendment Number 26.

(15)

APPROVALS	CONTRACTING PARTIES
By _____ Governor	_____ Contractor
By _____ Finance Director	By _____ Name & Title_____
STATE OF ALABAMA BUILDING COMMISSION	_____ Owner
Approved By _____ Director, Technical Staff	By _____ Name & Title_____
Recommended By _____ Contract Administrator	*The Awarding Authority certifies that funds are available in the amount required for this Construction Contract.*

(1)

PERFORMANCE BOND

USE BLACK INK ONLY

SURETY"S BOND NUMBER

Numbers in margin correspond to "Checklist", ABC Form B-7

(2) The **PRINCIPAL** (*Name and address of Contractor as appear in the Construction Contract*)

(3) The **SURETY** (*Name and Principal Place of Business*)

(4) The **OWNER** (*Name and address, same as appears in the Construction Contract*)

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above for the performance of the Contract, and Contract Change Orders, in accord with the requirements of the Contract Documents, which are incorporated herein by reference. If the Contractor performs the Contract, and Contract Change Orders, in accordance with the Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.
2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to "Checklist", ABC Form B-7

3. Whenever the Architect gives the Contractor and the Surety, at their addresses stated above, a written Notice to Cure a condition for which the Contract may be terminated in accordance with the Contract Documents, the Surety may, within the time stated in the notice, cure or provide the Architect with written verification that satisfactory positive action is in process to cure the condition.

4. The Surety's obligation under this Bond becomes effective after the Contractor fails to satisfy a Notice to Cure and the Owner:

(a) gives the Contractor and the Surety, at their addresses stated above, a written Notice of Termination declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the notice; and

(b) gives the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation under this Bond.

5. In the presence of the conditions described in Paragraph 4, the Surety shall, at its expense:

(a) On the effective date of the Notice of Termination, take charge of the Work and be responsible for the safety, security, and protection of the Work, including materials and equipment stored on and off the Project site, and

(b) Within twenty-one days after the effective date of the Notice of Termination, proceed, or provide the Owner with written verification that satisfactory positive action is in process to facilitate proceeding promptly, to complete the Work in accordance with the Contract Documents, either with the Surety's resources or through a contract between the Surety and a qualified contractor to whom the Owner has no reasonable objection.

6. As conditions precedent to taking charge of and completing the Work pursuant to Paragraph 5, the Surety shall neither require, nor be entitled to, any agreements or conditions other than those of this Bond and the Contract Documents. In taking charge of and completing the Work, the Surety shall assume all rights and obligations of the Contractor under the Contract Documents; however, the Surety shall also have the right to assert "Surety Claims" to the Owner in accordance with the Contract Documents. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to promptly take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

7. By accepting this Bond as a condition of executing the Construction Contract, and by taking the actions described in Paragraph 4, the Owner agrees that:

(a) the Owner shall promptly advise the Surety of the unpaid balance of the Contract Sum and, upon request, shall make available or furnish to the Surety, at the cost of reproduction, any portions of the Project Record, and

(b) as the Surety completes the Work, or has it completed by a qualified contractor, the Owner shall pay the Surety, in accordance with terms of payment of the Contract Documents, the unpaid balance of the Contract Sum, less any amounts that may be or become due the Owner from the Contractor under the Construction Contract or from the Contractor or the Surety under this Bond.

8. In the presence of the conditions described in Paragraph 4, the Surety's obligation includes responsibility for the correction of Defective Work, liquidated damages, and reimbursement of any reasonable expenses incurred by the Owner as a result of the Contractor's default under the Contract, including architectural, engineering, administrative, and legal services.

Numbers in margin correspond to "Checklist", ABC Form B-7

9. Nothing contained in this Bond shall be construed to mean that the Surety shall be liable to the Owner for an amount exceeding the Penal Sum of this Bond, except in the event that the Surety should be in default under the Bond by failing or refusing to take charge of and complete the Work pursuant to Paragraph 5. If the Surety should fail or refuse to take charge of and complete the Work, the Owner shall have the authority to take charge of and complete the Work, or have it completed, and the following costs to the Owner, less the unpaid balance of the Contract Sum, shall be recoverable under this Bond:

(a) the cost of completing the Contractor's responsibilities under the Contract, including correction of Defective Work;

(b) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to completing the Work;

(c) interest on, and the cost of obtaining, funds to supplement the unpaid balance of the Contract Sum as may be necessary to cover the foregoing costs;

(d) the fair market value of any reductions in the scope of the Work necessitated by insufficiency of the unpaid balance of the Contract Sum and available supplemental funds to cover the foregoing costs; and

(f) additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees incident to ascertaining and collecting the Owner's losses under the Bond.

10. All claims and disputes arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract.

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9) ATTEST:

_____

CONTRACTOR as PRINCIPAL:

_____

By _____

_____
Name and Title

(10) Countersigned by
Alabama Resident Agent for Surety:

By_____

_____
Name

_____
Address

SURETY:

_____

By_____

_____
Name and Title

(11) NOTE: Power of attorney for the Surety's signatory shall be furnished with the original and five copies of the bond.

(1)

PAYMENT BOND

USE BLACK INK ONLY

SURETY"S BOND NUMBER

Numbers in margin correspond to "Checklist", ABC Form B-7

(2) The **PRINCIPAL** (*Name and address of Contractor, same as appears in the Construction Contract*)

(3) The **SURETY** (*Name and Principal Place of Business*)

(4) The **OWNER(s)** (*Name and address, same as appears in the Construction Contract*)

(5) The **PENAL SUM** of this Bond (the Contract Sum)

Dollars ($).

(6) **DATE** of the Construction Contract :

(7) The **PROJECT**: (*Same as appears in the Construction Contract*)

1. **WE, THE PRINCIPAL (hereinafter "Contractor") AND THE SURETY**, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the Owner in the Penal Sum stated above to promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract, which is incorporated herein by reference, and any modifications thereof by Contract Change Orders. If the Contractor and its Subcontractors promptly pay all persons supplying labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders, then this obligation shall be null and void; otherwise to remain and be in full force and effect.
2. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

Numbers in margin correspond to "Checklist", ABC Form B-7

3. Any person that has furnished labor, materials, or supplies for or in the prosecution of the Contract and Contract Change Orders for which payment has not been timely made may institute a civil action upon this Bond and have their rights and claims adjudicated in a civil action and judgment entered thereon. Notwithstanding the foregoing, a civil action may not be instituted on this bond until 45 days after written notice to the Surety of the amount claimed to be due and the nature of the claim. The civil action must commence not later than one year from the date of final settlement of the Contract. The giving of notice by registered or certified mail, postage prepaid, addressed to the Surety at any of its places of business or offices shall be deemed sufficient. In the event the Surety or Contractor fails to pay the claim in full within 45 days from the mailing of the notice, then the person or persons may recover from the Contractor and Surety, in addition to the amount of the claim, a reasonable attorney's fee based on the result, together with interest on the claim from the date of the notice.

4. Every person having a right of action on this bond shall, upon written application to the Owner indicating that labor, material, or supplies for the Work have been supplied and that payment has not been made, be promptly furnished a certified copy of this bond and the Construction Contract. The claimant may bring a civil action in the claimant's name on this Bond against the Contractor and the Surety, or either of them, in the county in which the Work is to be or has been performed or in any other county where venue is otherwise allowed by law.

5. This bond is furnished to comply with Code of Alabama, §39-1-1, and all provisions thereof shall be applicable to civil actions upon this bond.

6. All claims and disputes between Owner and either the Contractor or Surety arising out of or related to this bond, or its breach, shall be resolved in accordance with Article 24, General Conditions of the Contract

(8) **SIGNED AND SEALED** this _____ day of _____, _____.

(9) ATTEST: **CONTRACTOR as PRINCIPAL:**

_____ _____

By _____

_____
Name and Title

(10) Countersigned by
Alabama Resident Agent for Surety: **SURETY:**

By_____ _____

_____ By_____
Name

_____ _____
Address Name and Title

(11) NOTE: Power of attorney for the Surety's signatory shall be furnished with the original and five copies of the bond.

GENERAL CONDITIONS of the CONTRACT

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ARTICLE 1
DEFINITIONS

Whenever the following terms, or pronouns in place of them, are used in the Contract Documents, the intent and meaning shall be interpreted as follows:

A. ALABAMA BUILDING COMMISSION: The Technical Staff of the Alabama Building Commission.

B. ARCHITECT: The Architect is the person or entity lawfully licensed to practice architecture in the State of Alabama, who is under contract with the Owner as the primary design professional for the Project and identified as the Architect in the Construction Contract. The term "Architect" means the Architect or the Architect's authorized representative. If the employment of the Architect is terminated, the Owner shall employ a new Architect whose status under the Contract Documents shall be that of the former Architect. If the primary design professional for the Project is a Professional Engineer, the term "Engineer" shall be substituted for the term "Architect" wherever it appears in this document.

C. BC PROJECT INSPECTOR: The member of the Technical Staff of the Alabama Building

Commission to whom the Project is assigned relative to executing the respective inspections and authorities described in Article 16, Inspection of the Work.

D. COMMISSION: The Alabama Building Commission, or any agency that may be designated by the Legislature as its successor.

E. CONTRACT: The Contract is the embodiment of the Contract Documents. The Contract represents the entire and integrated agreement between the Owner and Contractor and supersedes any prior written or oral negotiations, representations or agreements that are not incorporated into the Contract Documents. The Contract may be amended only by a Contract Change Order or a Modification to the Construction Contract. The contractual relationship which the Contract creates between the Owner and the Contractor extends to no other persons or entities. The Contract consists of the following Contract Documents, including all additions, deletions, and modifications incorporated therein before the execution of the Construction Contract:

(1) Construction Contract
(2) Performance and Payment Bonds
(3) Conditions of the Contract (General, Supplemental, and other Conditions)
(4) Specifications
(5) Drawings
(6) Contract Change Orders
(7) Modifications to the Construction Contract (applicable to PSCA Projects)

F. CONTRACT SUM: The Contract Sum is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. The term "Contract Sum" means the Contract Sum stated in the Construction Contract as may have been increased or decreased by Change Order(s) in accordance with the Contract Documents.

G. CONTRACT TIME: The Contract Time is the period of time in which the Contractor must achieve Substantial Completion of the Work. The date on which the Contract Time begins is specified in the written Notice To Proceed issued to the Contractor by the Owner or Director. The Date of Substantial Completion is the date established in accordance with Article 32. The term "Contract Time" means the Contract Time stated in the Construction Contract as may have been extended by Change Order(s) in accordance with the Contract Documents. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

H. CONTRACTOR: The Contractor is the person or persons, firm, partnership, joint venture, association, corporation, cooperative, limited liability company, or other legal entity, identified as such in the Construction Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

I. DEFECTIVE WORK: The term "Defective Work" shall apply to: **(1)** any product, material, system, equipment, or service, or its installation or performance, which does not conform to the requirements of the Contract Documents, **(2)** in-progress or completed Work the workmanship of which does not conform to the quality specified or, if not specified, to the quality produced by skilled workers performing work of a similar nature on similar projects in the state, **(3) s**ubstitutions and deviations not properly submitted and approved or otherwise authorized, **(4)** temporary supports, structures, or construction which will not produce the results required by the Contract Documents, and **(5)** materials or equipment rendered unsuitable for incorporation into the Work due

to improper storage or protection.

J. DIRECTOR: The Director of the Technical Staff of the Alabama Building Commission.

K. DRAWINGS: The Drawings are the portions of the Contract Documents showing graphically the design, location, layout, and dimensions of the Work, in the form of plans, elevations, sections, details, schedules, and diagrams.

L. NOTICE TO PROCEED: A proceed order issued by the Owner or Director, as applicable, fixing the date on which the Contractor shall begin the prosecution of the Work, which is also the date on which the Contract Time shall begin.

M. OWNER: The Owner is the entity or entities identified as such in the Construction Contract and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative. The term "Owner" as used herein shall be synonymous with the term "Awarding Authority" as defined and used in Title 39 - Public Works, Code of Alabama, 1975, as amended.

N. THE PROJECT: The Project is the total construction of which the Work required by these Contract Documents may be the entirety or only a part with other portions to be constructed by the Owner or separate contractors.

O. PROJECT MANUAL: The Project Manual is the volume usually assembled for the Work which may include the Advertisement for Bids, Instructions to Bidders, sample forms, General Conditions of the Contract, Supplementary Conditions, and Specifications of the Work.

P. SPECIFICATIONS: The Specifications are that portion of the Contract Documents which set forth in writing the standards of quality and performance of products, equipment, materials, systems, and services and workmanship required for acceptable performance of the Work.

Q. SUBCONTRACTOR: A Subcontractor is a person or entity who is undertaking the performance of any part of the Work by virtue of a contract with the Contractor. The term "Subcontractor" means a Subcontractor or its authorized representatives.

R. THE WORK: The Work is the construction and services required by the Contract Documents and includes all labor, materials, supplies, equipment, and other items and services as are necessary to produce the required construction and to fulfill the Contractor's obligations under the Contract. The Work may constitute the entire Project or only a portion of it.

ARTICLE 2
INTENT and INTERPRETATION of the CONTRACT DOCUMENTS

A. INTENT

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary

or permanent and whether or not incorporated or to be incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

B. COMPLEMENTARY DOCUMENTS

The Contract Documents are complementary. If Work is required by one Contract Document, the Contractor shall perform the Work as if it were required by all of the Contract Documents. However, the Contractor shall be required to perform Work only to the extent that is consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

C. ORDER of PRECEDENCE

Should any discrepancy arise between the various elements of the Contract Documents, precedence shall be given to them in the following order unless to do so would contravene the apparent Intent of the Contract Documents stated in preceding Paragraph A:

(1) The Construction Contract.
(2) Addenda, with those of later date having precedence over those of earlier date.
(3) Supplementary Conditions (or other Conditions which modify the General Conditions of the Contract).
(4) General Conditions of the Contract.
(5) The Specifications.
(6) Details appearing on the Drawings; large scale details shall take precedence over smaller scale details.
(7) The Drawings; large scale drawings shall take precedence over smaller scale drawings.

D. ORGANIZATION

Except as may be specifically stated within the technical specifications, neither the organization of the Specifications into divisions, sections, or otherwise, nor any arrangement of the Drawings shall control how the Contractor subcontracts portions of the Work or assigns Work to any trade.

E. INTERPRETATION

(1) The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the Intent of the Contract Documents stated in preceding Paragraph A. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not In Contract" ("N.I.C."), the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor's expense to produce a product or system that is complete, appropriately tested, and in operative condition ready for use or subsequent construction or operation of the Owner or separate contractors. The omission of words or phases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

(2) Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings

unless otherwise indicated.

(3) Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement for Bids.

(4) In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

(5) Generally, portions of the Contract Documents written in longhand take precedence over typed portions, and typed portions take precedence over printed portions.

(6) Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

F. SEVERABILITY.

The partial or complete invalidity of any one or more provision of this Contract shall not affect the validity or continuing force and effect of any other provision.

ARTICLE 3
CONTRACTOR'S REPRESENTATIONS

By executing the Construction Contract the Contractor represents to the Owner:

A. The Contractor has visited the site of the Work to become familiar with local conditions under which the Work is to be performed and to evaluate reasonably observable conditions as compared with requirements of the Contract Documents.

B. The Contractor shall use its best skill and attention to perform the Work in an expeditious manner consistent with the Contract Documents.

C. The Contractor is an independent contractor and in performance of the Contract remains and shall act as an independent contractor having no authority to represent or obligate the Owner in any manner unless authorized by the Owner in writing.

ARTICLE 4
DOCUMENTS FURNISHED to CONTRACTOR

Unless otherwise provided in the Contract Documents, twenty sets of Drawings and Project Manuals will be furnished to the Contractor by the Architect without charge. Other copies requested will be furnished at reproduction cost.

ARTICLE 5
OWNERSHIP of DRAWINGS

All original or duplicated Drawings, Specifications, and other documents prepared by the Architect, and furnished to the Contractor are the property of the Architect and are to be used solely for this Project and not to be used in any manner for other work. Upon completion of the Work, all copies of Drawings and Specifications, with the exception of the Contractor's record set, shall be returned or accounted for by the Contractor to the Architect, on request.

ARTICLE 6
SUPERVISION, SUPERINTENDENT, and EMPLOYEES

A. SUPERVISION and CONSTRUCTION METHODS

(1) The term "Construction Methods" means the construction means, methods, techniques, sequences, and procedures utilized by the Contractor in performing the Work. The Contractor is solely responsible for supervising and coordinating the performance of the Work, including the selection of Construction Methods, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Contractor is solely and completely responsible for job site safety, including the protection of persons and property in accordance with Article 14.

(3) The Contractor shall be responsible to the Owner for acts and omissions of not only the Contractor and its agents and employees, but all persons and entities, and their agents and employees, who are performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

(4) The Contractor shall be responsible to inspect the in-progress and completed Work to verify its compliance with the Contract Documents and to insure that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work.

B. SUPERINTENDENT

(1) The Contractor shall employ and maintain a competent level of supervision for the performance of the Work at the Project site, including a superintendent who shall: **(a)** have full authority to receive instructions from the Architect or Owner and to act on those instructions and **(b)** be present at the Project site at all times during which Work is being performed.

(2) Before beginning performance of the Work, the Contractor shall notify the Architect in writing of the name and qualifications of its proposed superintendent so that the Owner may review the individual's qualifications. If, for reasonable cause, the Owner refuses to approve the individual, or withdraws its approval after once giving it, the Contractor shall name a different superintendent for the Owner's review and approval. Any disapproved superintendent will not perform in that capacity thereafter at the Project site.

C. EMPLOYEES

The Contractor shall permit only fit and skilled persons to perform the Work. The Contractor shall

enforce safety procedures, strict discipline, and good order among persons performing the Work. The Contractor will remove from its employment on the Project any person who deliberately or persistently produces non-conforming Work or who fails or refuses to conform to reasonable rules of personal conduct contained in the Contract Documents or implemented by the Owner and delivered to the Contractor in writing during the course of the Work.

ARTICLE 7
REVIEW of CONTRACT DOCUMENTS and FIELD CONDITIONS by CONTRACTOR

A. In order to facilitate assembly and installation of the Work in accordance with the Contract Documents, before starting each portion of the Work, the Contractor shall examine and compare the relevant Contract Documents, and compare them to relevant field measurements made by the Contractor and any conditions at the site affecting that portion of the Work.

B. If the Contractor discovers any errors, omissions, or inconsistencies in the Contract Documents, the Contractor shall promptly report them to the Architect as a written request for information that includes a detailed statement identifying the specific Drawings or Specifications that are in need of clarification and the error, omission, or inconsistency discovered in them.

(1) The Contractor shall not be expected to act as a licensed design professional and ascertain whether the Contract Documents comply with applicable laws, statutes, ordinances, building codes, and rules and regulations, but the Contractor shall be obligated to promptly notify the Architect of any such noncompliance discovered by or made known to the Contractor. If the Contractor performs Work without fulfilling this notification obligation, the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

(2) The Contractor shall not be liable to the Owner for errors, omissions, or inconsistencies that may exist in the Contract Documents, or between the Contract Documents and conditions at the site, unless the Contractor knowingly fails to report a discovered error, omission, or inconsistency to the Architect, in which case the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

C. If the Contractor considers the Architect's response to a request for information to constitute a change to the Contract Documents involving additional costs and/or time, the Contractor shall follow the procedures of Article 20, Claims for Extra Cost or Extra Work.

D. If, with undue frequency, the Contractor requests information that is obtainable through reasonable examination and comparison of the Contract Documents, site conditions, and previous correspondence, interpretations, or clarifications, the Contractor shall be liable to the Owner for reasonable charges from the Architect for the additional services required to review, research, and respond to such requests for information.

ARTICLE 8
SURVEYS by CONTRACTOR

A. The Contractor shall provide competent engineering services to assure accurate execution of the Work in accordance with the Contract Documents. The Contractor shall verify the figures given for

the contours, approaches and locations shown on the Drawings before starting any Work and be responsible for the accuracy of the finished Work. Without extra cost to the Owner, the Contractor shall engage a licensed surveyor if necessary to verify boundary lines, keep within property lines, and shall be responsible for encroachments on rights or property of public or surrounding property owners.

B. The Contractor shall establish all base lines for the location of the principal components of the Work and make all detail surveys necessary for construction, including grade stakes, batter boards and other working points, lines and elevations. If the Work involves alteration of or addition to existing structures or improvements, the Contractor shall locate and measure elements of the existing conditions as is necessary to facilitate accurate fabrication, assembly, and installation of new Work in the relationship, alignment, and/or connection to the existing structure or improvement as is shown in the Contract Documents.

ARTICLE 9
SUBMITTALS

A. Where required by the Contract Documents, the Contractor shall submit shop drawings, product data, samples and other information (hereinafter referred to as Submittals) to the Architect for the purpose of demonstrating the way by which the Contractor proposes to conform to the requirements of the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

B. The Contractor shall be responsible to the Owner for the accuracy of its Submittals and the conformity of its submitted information to the requirements of the Contract Documents. Each Submittal shall bear the Contractor's approval, evidencing that the Contractor has reviewed and found the information to be in compliance with the requirements of the Contract Documents. Submittals which are not marked as reviewed and approved by the Contractor may be returned by the Architect without action.

C. The Contractor shall prepare and deliver its submittals to the Architect sufficiently in advance of construction requirements and in a sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. In coordinating the Submittal process with its construction schedule, the Contractor shall allow sufficient time to permit adequate review by the Architect.

D. By approving a Submittal the Contractor represents not only that the element of Work presented in the Submittal complies with the requirements of the Contract Documents, but also that the Contractor has:

(1) found the layout and/or dimensions in the Submittal to be comparable with those in the Contract Documents and other relevant Submittals and has made field measurements as necessary to verify their accuracy, and
(2) determined that products, materials, systems, equipment and/or procedures presented in the Submittal are compatible with those presented, or being presented, in other relevant Submittals and with the Contractor's intended Construction Methods.

E. The Contractor shall not fabricate or perform any portion of the Work for which the Contract Documents require Submittals until the respective Submittals have been approved by the Architect.

F. In the case of a resubmission, the Contractor shall direct specific attention to all revisions in a Submittal. The Architect's approval of a resubmission shall not apply to any revisions that were not brought to the Architect's attention.

G. If the Contract Documents specify that a Submittal is to be prepared and sealed by a registered architect or licensed engineer retained by the Contractor, all drawings, calculations, specifications, and certifications of the Submittal shall bear the Alabama seal of registration and signature of the registered/licensed design professional who prepared them or under whose supervision they were prepared. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of such a Submittal, provided that all performance and design criteria that such Submittal must satisfy are sufficiently specified in the Contract Documents. The Architect will review, approve or take other appropriate action on such a Submittal only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria specified in the Contract Documents.

H. DEVIATIONS

(1) The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures of Article 19.

(2) Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

(3) The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

I. ARCHITECT'S REVIEW and APPROVAL

(1) The Architect will review the Contractor's Submittals for conformance with requirements of, and the design concept expressed in, the Contract Documents and will approve or take other appropriate action upon them. This review is not intended to verify the accuracy and completeness of details such as dimensions and quantities nor to substantiate installation instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor. However, the Architect shall advise the Contractor of any errors or omissions which the Architect may detect during this review. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(2) The Architect will review and respond to all Submittals with reasonable promptness to avoid delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time to permit adequate review.

(3) No corrections or changes to Submittals indicated by the Architect will be considered as authorizations to perform Extra Work. If the Contractor considers such correction or change of a Submittal to require Work which differs from the requirements of the Contract Documents, the Contractor shall promptly notify the Architect in writing in accordance with Article 20, Claims for Extra Cost or Extra Work.

J. CONFORMANCE with SUBMITTALS

The Work shall be constructed in accordance with approved Submittals.

ARTICLE 10
DOCUMENTS and SAMPLES at the SITE

A. "AS ISSUED" SET

The Contractor shall maintain at the Project site, in good order, at least one copy of all Addenda, Change Orders, supplemental drawings, written directives and clarifications, and approved Submittals intact as issued, and an updated construction schedule.

B. "POSTED" SET

The Contractor shall maintain at the Project site, in good order, at least one set of the Drawings and Project Manual into which the Contractor has "posted"(incorporated) all Addenda, Change Orders, supplemental drawings, clarifications, and other information pertinent to the proper performance of the Work. The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are "posted" with the current information to insure that updated Contract Documents are used for performance of the Work.

C. RECORD SET

One set of the Drawings and Project Manual described in Paragraph B shall be the Contractor's record set in which the Contractor shall record all field changes, corrections, selections, final locations, and other information as will be duplicated on the "As-built" documents required under Article 11. The Contractor shall record such "as-built" information in its record set as it becomes available through progress of the Work. The Contractor's performance of this requirement shall be subject to confirmation by the Architect at any time as a prerequisite to approval of Progress Payments.

D. The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, BC Project Inspector, and their representatives.

ARTICLE 11
"AS-BUILT" DOCUMENTS

A. Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets of "As-built" documents, as described herein, to the Architect for submission to the Owner upon completion of the Work. Each set of "As-built' documents shall consist of a copy of the Drawings and Project Manual, in like-new condition, into which the Contractor has neatly incorporated all Addenda, Change Orders, supplemental drawings, clarifications, field changes, corrections, selections, actual locations of underground utilities, and other information as required herein or specified elsewhere in the Contract Documents.

B. The Contractor shall use the following methods for incorporating information into the "As-built" documents:

(1) Drawings

(a) To the greatest extent practicable, information shall be carefully drawn and lettered, in ink, on the Drawings in the form of sketches, details, plans, notes, and dimensions as required to provide a fully dimensioned record of the Work. When required for clarity, sketches, details, or partial plans shall be drawn on supplemental sheets and bound into the Drawings and referenced on the drawing being revised.

(b) Where a revised drawing has been furnished by the Architect, the drawing of latest date shall be bound into the Drawings in the place of the superseded drawing.

(c) Where a supplemental drawing has been furnished by the Architect, the supplemental drawing shall be bound into the Drawings in an appropriate location and referred to by notes added to the drawing being supplemented.

(d) Where the Architect has furnished details, partial plans, or lengthy notes of which it would be impractical for the Contractor to redraw or letter on a drawing, such information may be affixed to the appropriate drawing with transparent tape if space is available on the drawing.

(e) Any entry of information made in the Drawings that is the result of an Addendum or Change Order, shall identify the Addendum or Change Order from which it originated.

(2) Project Manual

(a) A copy of all Addenda and Change Orders, excluding drawings thereof, shall be bound in the front of the Project Manual.

(b) Where a document, form, or entire specification section is revised, the latest issue shall be bound into the Project Manual in the place of the superseded issue.

(c) Where information within a specification section is revised, the deleted or revised information shall be drawn through in ink and an adjacent note added identifying the Addendum or Change Order containing the revised information.

C. Within ten days after the Date of Substantial Completion of the Work, or the last completed portion of the Work, the Contractor shall submit the "As-built" documents to the Architect for approval. If the Architect requires that any corrections be made, the documents will be returned in a reasonable time for correction and resubmission.

ARTICLE 12
PROGRESS SCHEDULE

(Not applicable if the Contract Time is 60 days or less.)

A. The Contractor shall within fifteen days after the date of commencement stated in the Notice to Proceed, or such other time as may be provided in the Contract Documents, prepare and submit to

the Architect for review and approval a practicable construction schedule informing the Architect and Owner of the order in which the Contractor plans to carry on the Work within the Contract Time. The Architect's review and approval of the Contractor's construction schedule shall be only for compliance with the specified format, Contract Time, and suitability for monitoring progress of the Work and shall not be construed as a representation that the Architect has analyzed the schedule to form opinions of sequences or durations of time represented in the schedule.

B. If a schedule format is not specified elsewhere in the Contract Documents, the construction schedule shall be prepared using ABC' Form C-11, "Progress Schedule and Report", (contained in the Project Manual) or similar format of suitable scale and detail to indicate the percentage of Work scheduled to be completed at the end of each month. At the end of each month the Contractor shall enter the actual percentage of completion on the construction schedule submit two copies to the Architect, and attach one copy to each copy of the monthly Application for Payment. The construction schedule shall be revised to reflect any agreed extensions of the Contract Time or as required by conditions of the Work.

C. If a more comprehensive schedule format is specified elsewhere in the Contract Documents or voluntarily employed by the Contractor, ABC Form C-11 shall also be prepared, updated, and submitted as described in preceding Paragraph B.

D. The Contractor's construction schedule shall be used by the Contractor, Architect, and Owner to determine the adequacy of the Contractor's progress. The Contractor shall be responsible for maintaining progress in accordance with the currently approved construction schedule and shall increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant and equipment as may be necessary to do so. If the Contractor's progress falls materially behind the currently approved construction schedule and, in the opinion of the Architect or Owner, the Contractor is not taking sufficient steps to regain schedule, the Architect may, with the Owner's concurrence, issue the Contractor a Notice to Cure pursuant to Article 27. In such a Notice to Cure the Architect may require the Contractor to submit such supplementary or revised construction schedules as may be deemed necessary to demonstrate the manner in which schedule will be regained.

ARTICLE 13
EQUIPMENT, MATERIALS, and SUBSTITUTIONS

A. Every part of the Work shall be executed in a workmanlike manner in accordance with the Contract Documents and approved Submittals. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work and shall be new except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise.

B. Whenever a product, material, system, item of equipment, or service is identified in the Contract Documents by reference to a trade name, manufacturer's name, model number, etc.(hereinafter referred to as "source"), and only one or two sources are listed, or three or more sources are listed and followed by "or approved equal" or similar wording, it is intended to establish a required standard of performance, design, and quality, and the Contractor may submit, for the Architect's approval, products, materials, systems, equipment, or services of other sources which the Contractor can prove to the Architect's satisfaction are equal to, or exceed, the standard of

performance, design and quality specified, unless the provisions of Paragraph D below apply. Such proposed substitutions are not to be purchased or installed without the Architect's written approval of the substitution.

C. If the Contract Documents identify three or more sources for a product, material, system, item of equipment or service to be used and the list of sources is not followed by "or approved equal" or similar wording, the Contractor may make substitution only after evaluation by the Architect and execution of an appropriate Contract Change Order.

D. If the Contract Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the Contractor must furnish the identified sole source.

ARTICLE 14
SAFETY and PROTECTION of PERSONS and PROPERTY

A. The Contractor shall be solely and completely responsible for conditions at the Project site, including safety of all persons (including employees) and property. The Contractor shall create, maintain, and supervise conditions and programs to facilitate and promote safe execution of the Work, and shall supervise the Work with the attention and skill required to assure its safe performance. Safety provisions shall conform to OSHA requirements and all other federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. Nothing contained in this Contract shall be construed to mean that the Owner has employed the Architect nor has the Architect employed its consultants to administer, supervise, inspect, or take action regarding safety programs or conditions at the Project site.

B. The Contractor shall employ Construction Methods, safety precautions, and protective measures that will reasonably prevent damage, injury or loss to:

(1) workers and other persons on the Project site and in adjacent and other areas that may be affected by the Contractor's operations;

(2) the Work and materials and equipment to be incorporated into the Work and stored by the Contractor on or off the Project site; and

(3) other property on, or adjacent to, the Project site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and other improvements not designated in the Contract Documents to be removed, relocated, or replaced.

C. The Contractor shall be responsible for the prompt remedy of damage and loss to property, including the filing of appropriate insurance claims, caused in whole or in part by the fault or negligence of the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

D. The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety and protection of persons or property, including without limitation notices to adjoining property owners of excavation or other construction activities that potentially could cause damage or injury to adjoining property or persons thereon.

E. The Contractor shall erect and maintain barriers, danger signs, and any other reasonable safeguards and warnings against hazards as may be required for safety and protection during performance of the Contract and shall notify owners and users of adjacent sites and utilities of conditions that may exist or arise which may jeopardize their safety.

F. If use or storage of explosives or other hazardous materials or equipment or unusual Construction Methods are necessary for execution of the Work, the Contractor shall exercise commensurate care and employ supervisors and workers properly qualified to perform such activity.

G. The Contractor shall furnish a qualified safety representative at the Project site whose duties shall include the prevention of accidents. The safety representative shall be the Contractor's superintendent, unless the Contractor assigns this duty to another responsible member of its on-site staff and notifies the Owner and Architect in writing of such assignment.

H. The Contractor shall not permit a load to be applied, or forces introduced, to any part of the construction or site that may cause damage to the construction or site or endanger safety of the construction, site, or persons on or near the site.

I. The Contractor shall have the right to act as it deems appropriate in emergency situations jeopardizing life or property. The Contractor shall be entitled to equitable adjustment of the Contract Sum or Contract Time for its efforts expended for the sole benefit of the Owner in an emergency. Such adjustment shall be determined as provided in Articles 19 and 20.

J. The duty of the Architect and the Architect's consultants to visit the Project site to conduct periodic inspections of the Work or for other purposes shall not give rise to a duty to review or approve the adequacy of the Contractor's safety program, safety supervisor, or any safety measure which Contractor takes or fails to take in, on, or near the Project site.

ARTICLE 15
HAZARDOUS MATERIALS

A. A Hazardous Material is any substance or material identified as hazardous under any federal, state, or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing its handling, disposal, and/or clean-up. Existing Hazardous Materials are Hazardous Materials discovered at the Project site and not introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

B. If, during the performance of the Work, the Contractor encounters a suspected Existing Hazardous Material, the Contractor shall immediately stop work in the affected area, take measures appropriate to the condition to keep people away from the suspected Existing Hazardous Material, and immediately notify the Architect and Owner of the condition in writing.

C. The Owner shall obtain the services of an independent laboratory or professional consultant, appropriately licensed and qualified, to determine whether the suspected material is a Hazardous Material requiring abatement and, if so, to certify after its abatement that it has been rendered harmless. Any abatement of Existing Hazardous Materials will be the responsibility of the Owner. The Owner will advise the Contractor in writing of the persons or entities who will determine the

nature of the suspected material and those who will, if necessary, perform the abatement. The Owner will not employ persons or entities to perform these services to whom the Contractor or Architect has reasonable objection.

D. After certification by the Owner's independent laboratory or professional consultant that the material is harmless or has been rendered harmless, work in the affected area shall resume upon written agreement between the Owner and Contractor. If the material is found to be an Existing Hazardous Material and the Contractor incurs additional cost or delay due to the presence and abatement of the material, the Contract Sum and/or Contract Time shall be appropriately adjusted by a Contract Change Order pursuant to Article 19.

E. The Owner shall not be responsible for Hazardous Materials introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable unless such Hazardous Materials were required by the Contract Documents.

ARTICLE 16
INSPECTION of the WORK

A. GENERAL

(1) The Contractor is solely responsible for the Work's compliance with the Contract Documents; therefore, the Contractor shall be responsible to inspect in-progress and completed Work, and shall verify its compliance with the Contract Documents and that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work. Neither the presence nor absence of inspections by the Architect, Owner, Director, BC Project Inspector, any public authority having jurisdiction, or their representatives shall relieve the Contractor of responsibility to inspect the Work, for responsibility for Construction Methods and safety precautions and programs in connection with the Work, or from any other requirement of the Contract Documents.

(2) The Architect, Owner, Director, BC Project Inspector, any public authority having jurisdiction, and their representatives shall have access at all times to the Work for inspection whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. All materials, workmanship, processes of manufacture, and methods of construction, if not otherwise stipulated in the Contract Documents, shall be subject to inspection, examination, and test at any and all places where such manufacture and/or construction are being carried on. Such inspections will not unreasonably interfere with the Contractor's operations.

(3) The Architect will inspect the Work as a representative of the Owner. The Architect's inspections may be supplemented by inspections by the BC Project Inspector as a representative of the Alabama Building Commission.

(4) The Contractor may be charged by the Owner for any extra cost of inspection incurred by the Owner or Architect on account of material and workmanship not being ready at the time of inspection set by the Contractor.

B. TYPES of INSPECTIONS

(1) SCHEDULED INSPECTIONS and CONFERENCES. Scheduled Inspections and Conferences are conducted by the Architect, scheduled by the Architect in coordination with the Contractor and BC Project Inspector, and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers, and the BC Project Inspector. Scheduled Inspections and Conferences of this Contract include:

(a) Pre-construction Conference.

(b) Pre-roofing Conference (not applicable if the Contract involves no roofing work)

(**c) Above Ceiling Inspection(s)**: An above ceiling inspection of all spaces in the building is required before the ceiling material is installed. Above ceiling inspections are to be conducted at a time when all above ceiling systems are complete and tested to the greatest extent reasonable pending installation of the ceiling material. System identifications and markings are to be complete. All fire-rated construction including fire-stopping of penetrations and specified identification above the ceiling shall be complete. Ceiling framing and suspension systems shall be complete with lights, grilles and diffusers, access panels, fire protection drops for sprinkler heads, etc., installed in their final locations to the greatest extent reasonable. Above ceiling framing to support ceiling mounted equipment shall be complete. The above ceiling construction shall be complete to the extent that after the inspection the ceiling material can be installed without disturbance.

(**d) Final Inspection(s):** A Final Inspection shall establish that the Work, or a designated portion of the Work, is Substantially Complete in accordance with Article 32 and is accepted by the Architect, Owner, and BC Project Inspector as being ready for the Owner's occupancy or use. At the conclusion of this inspection, items requiring correction or completion ("punch list" items) shall be minimal and require only a short period of time for accomplishment to establish Final Acceptance of the Work. If the Work, or designated portion of the Work, includes the installation, or modification, of a fire alarm system or other life safety systems essential to occupancy, such systems shall have been tested and appropriately certified before the Final Inspection.

(**e) Year-end Inspection(s):** An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one year warranty period(s). The subsequent delivery of the Architect's report of this inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period in accordance with Article 35.

(2) PERIODIC INSPECTIONS. Periodic Inspections are conducted throughout the course of the Work by the Architect, the Architect's consultants, their representatives, and the BC Project Inspector, jointly or independently, with or without advance notice to the Contractor.

(3) SPECIFIED INSPECTIONS and TESTS. Specified Inspections and Tests include inspections, tests, demonstrations, and approvals that are either specified in the Contract Documents or required by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction, to be performed by the Contractor, one of its Subcontractors, or an independent testing laboratory or firm (whether paid for by the Contractor or Owner).

C. INSPECTIONS by the ARCHITECT

(1) The Architect is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations as defined in Article 9 and "minor" changes as defined in Article 19), to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner.

(2) The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations and as otherwise necessary to:

(a) become generally familiar with the in-progress and completed Work and the quality of the Work,

(b) determine whether the Work is progressing in general accordance with the Contractor's schedule and is likely to be completed within the Contract Time,

(c) visually compare readily accessible elements of the Work to the requirements of the Contract Documents to determine, in general, if the Contractor's performance of the Work indicates that the Work will conform to the requirements of the Contract Documents when completed,

(d) endeavor to guard the Owner against Defective Work,

(e) review and address with the Contractor any problems in implementing the requirements of the Contract Documents that the Contractor may have encountered, and

(f) keep the Owner fully informed about the Project.

(3) The Architect shall have the authority to reject Defective Work or require its correction, but shall not be required to make exhaustive investigations or examinations of the in-progress or completed portions of the Work to expose the presence of Defective Work. However, it shall be an obligation of the Architect to report in writing, to the Owner, Contractor, and BC Project Inspector, any Defective Work recognized by the Architect.

(4) The Architect shall have the authority to require the Contractor to stop work only when, in the Architect's reasonable opinion, such stoppage is necessary to avoid Defective Work. The Architect shall not be liable to the Contractor or Owner for the consequences of any decisions made by the Architect in good faith either to exercise or not to exercise this authority.

(5) "Inspections by the Architect" includes appropriate inspections by the Architect's consultants as dictated by their respective disciplines of design and the stage of the Contractor's operations.

D. INSPECTIONS by the BC PROJECT INSPECTOR

(1) The BC Project Inspector will:

(a) participate in scheduled inspections and conferences as practicable,

(b) perform periodic inspections of in-progress and completed Work to ensure code compliance of the Project and general conformance of the Work with the Contract Documents, and

(c) monitor the Contractor's progress and performance of the Work.

(2) The BC Project Inspector shall have the authority to:

(a) reject Work that is not in compliance with the State Building Code adopted by the Commission, unless the Work is in accordance with the Contract Documents in which case the BC Project Inspector will advise the Architect to initiate appropriate corrective action, and

(b) notify the Architect, Owner, and Contractor of Defective Work recognized by the BC Project Inspector.

(3) The BC Project Inspector's periodic inspections will usually be scheduled around key stages of construction based upon information reported by the Architect. As the Architect or Owner

deems appropriate, the BC Project Inspector, as well as other members of the Technical Staff, can be requested to schedule special inspections or meetings to address specific matters. The written findings of BC Project Inspector will be transmitted to the Owner, Contractor, and Architect.

(4) The BC Project Inspector is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents, to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner. The Contractor shall not proceed with Work as a result of instructions or findings of the BC Project Inspector which the Contractor considers to be a change to the requirements of the Contract Documents without written authorization of the Owner through the Architect.

E. UNCOVERING WORK

(1) If the Contractor covers a portion of the Work before it is examined by the Architect and this is contrary to the Architect's request or specific requirements in the Contract Documents, then, upon written request of the Architect, the Work must be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

(2) Without a prior request or specific requirement that Work be examined by the Architect before it is covered, the Architect may request that Work be uncovered for examination and the Contractor shall uncover it. If the Work is in accordance with the Contract Documents, the Contract Sum shall be equitably adjusted under Article 19 to compensate the Contractor for the costs of uncovering and replacement. If the Work is not in accordance with the Contract Documents, uncovering, correction, and replacement shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

F. SPECIFIED INSPECTIONS and TESTS

(1) The Contractor shall schedule and coordinate Specified Inspections and Tests to be made at appropriate times so as not to delay the progress of the Work or the work of the Owner or separate contractors. If the Contract Documents require that a Specified Inspection or Test be witnessed or attended by the Architect or Architect's consultant, the Contractor shall give the Architect timely notice of the time and place of the Specified Inspection or Test. If a Specified Inspection or Test reveals that Work is not in compliance with requirements of the Contract Documents, the Contractor shall bear the costs of correction, repeating the Specified Inspection or Test, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services. Through appropriate Contract Change Order the Owner shall bear costs of tests, inspections or approvals which become Contract requirements subsequent to the receipt of bids.

(2) If the Architect, Owner, or public authority having jurisdiction determines that inspections, tests, demonstrations, or approvals in addition to Specified Inspections and Tests are required, the Contractor shall, upon written instruction from the Architect, arrange for their performance by an entity acceptable to the Owner, giving timely notice to the architect of the time and place of their performance. Related costs shall be borne by the Owner unless the procedures reveal that Work is not in compliance with requirements of the Contract Documents, in which case the Contractor shall bear the costs of correction, repeating the procedures, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services.

(3) Unless otherwise required by the Contract Documents, required certificates of Specified Inspections and Tests shall be secured by the Contractor and promptly delivered to the Architect.

(4) Failure of any materials to pass Specified Inspections and Tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material for use in the Work.

ARTICLE 17
CORRECTION of DEFECTIVE WORK

A. The Contractor shall, at the Contractor's expense, promptly correct Defective Work rejected by the Architect or which otherwise becomes known to the Contractor, removing the rejected or nonconforming materials and construction from the project site.

B. Correction of Defective Work shall be performed in such a timely manner as will avoid delay of completion, use, or occupancy of the Work and the work of the Owner and separate contractors.

C. The Contractor shall bear all expenses related to the correction of Defective Work, including but not limited to: **(1)** additional testing and inspections, including repeating Specified Inspections and Tests**, (2)** reasonable services and expenses of the Architect, and **(3)** the expense of making good all work of the Contractor, Owner, or separate contractors destroyed or damaged by the correction of Defective Work.

ARTICLE 18
DEDUCTIONS for UNCORRECTED WORK

If the Owner deems it advisable and in the Owner's interest to accept Defective Work, the Owner may allow part or all of such Work to remain in place, provided an equitable deduction from the Contract Sum, acceptable to the Owner, is offered by the Contractor.

ARTICLE 19
CHANGES in the WORK

A. GENERAL

(1) The Owner may at any time direct the Contractor to make changes in the Work which are within the general scope of the Contract, including changes in the Drawings, Specifications, or other portions of the Contract Documents to add, delete, or otherwise revise portions of the Work. The Architect is authorized by the Owner to direct "minor" changes in the Work by written order to the Contractor. "Minor" changes in the Work are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Changes in the Work which are not "minor" may be authorized only by the Owner.

(2) If the Owner directs a change in the Work, the change shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract, stating their agreement upon the change or changes in the Work and the adjustments, if any, in the Contract Sum and the Contract Time.

(3) Subject to compliance with Alabama's Public Works Law, the Owner may, upon agreement by the Contractor, incorporate previously unawarded bid alternates into the Contract.

(4) In the event of a claim or dispute as to the appropriate adjustment to the Contract Sum or Contract Time due to a directive to make changes in the Work, the Work shall proceed as provided in this article subject to subsequent agreement of the parties or final resolution of the dispute pursuant to Article 24.

(5) Consent of surety will be obtained for all Contract Change Orders involving an increase in the Contract Sum.

(6) Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly to perform changes in the Work, unless otherwise directed by the Owner through the Architect.

B. DETERMINATION of ADJUSTMENT of the CONTRACT SUM

The adjustment of the Contract Sum resulting from a change in the Work shall be determined by one of the following methods, or a combination thereof, as selected by the Owner:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(2) Unit Price. By application of Unit Prices included in the Contract or subsequently agreed to by the parties. However, if the character or quantity originally contemplated is materially changed so that application of such unit price to quantities of Work proposed will cause substantial inequity to either party, the applicable unit price shall be equitably adjusted.

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under

Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

C. ADJUSTMENT of the CONTRACT TIME due to CHANGES

(1) Unless otherwise provided in the Contract Documents, the Contract Time shall be equitably adjusted for the performance of a change provided that the Contractor notifies the Architect in writing that the change will increase the time required to complete the Work. Such notice shall be provided no later than:

(a) with the Contractor's cost proposal stating the number of days of extension requested, or

(b) within ten days after the Contractor receives a directive to proceed with a change in advance of submitting a cost proposal, in which case the notice should provide an estimated number of days of extension to be requested, which may be subject to adjustment in the cost proposal.

(2) The Contract Time shall be extended only to the extent that the change affects the time required to complete the entire Work of the Contract, taking into account the concurrent performance of the changed and unchanged Work.

D. CHANGE ORDER PROCEDURES

(1) If the Owner proposes to make a change in the Work, the Architect will request that the Contractor provide a cost proposal for making the change to the Work. The request shall be in writing and shall adequately describe the proposed change using drawings, specifications, narrative, or a combination thereof. Within 21 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit to the Architect a written proposal, properly itemized and supported by sufficient substantiating data to facilitate evaluation. The stated time within which the Contractor must submit a proposal may be extended if, within that time, the Contractor makes a written request with reasonable justification thereof.

(2) The Contractor may voluntarily offer a change proposal which, in the Contractor's opinion, will reduce the cost of construction, maintenance, or operation or will improve the cost-effective performance of an element of the Project, in which case the Owner, through the Architect, will

accept, reject, or respond otherwise within 21 days after receipt of the proposal, or such other reasonable time as the Contractor may state in the proposal.

(3) If the Contractor's proposal is acceptable to the Owner, or is negotiated to the mutual agreement of the Contractor and Owner, the Architect will prepare an appropriate Contract Change Order for execution. Upon receipt of the fully executed Contract Change Order, the Contractor shall proceed with the change.

(4) In advance of delivery of a fully executed Contract Change Order, the Architect may furnish to the Contractor a written authorization to proceed with an agreed change. However, such an authorization shall be effective only if it:

(a) identifies the Contractor's accepted or negotiated proposal for the change,
(b) states the agreed adjustments, if any, in Contract Sum and Contract Time,
(c) states that funds are available to pay for the change, and
(d) is signed by the Owner.

(5) If the Contractor and Owner cannot agree on the amount of the adjustment in the Contract Sum for a change, the Owner, through the Architect, may order the Contractor to proceed with the change on a Force Account basis, but the net cost to the Owner shall not exceed the amount quoted in the Contractor's proposal. Such order shall state that funds are available to pay for the change.

(6) If the Contractor does not promptly respond to a request for a proposal, or the Owner determines that the change is essential to the final product of the Work and that the change must be effected immediately to avoid delay of the Project, the Owner may:

(a) determine with the Contractor a sufficient maximum amount to be authorized for the change and
(b) direct the Contractor to proceed with the change on a Force Account basis pending delivery of the Contractor's proposal, stating the maximum increase in the Contract Sum that is authorized for the change.

(7) Pending agreement of the parties or final resolution of any dispute of the total amount due the Contractor for a change in the Work, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by an interim Change Order indicating the parties' agreement with part of all of such costs or time extension. Once a dispute is resolved, it shall be implemented by preparation and execution of an appropriate Change Order.

ARTICLE 20
CLAIMS for EXTRA COST or EXTRA WORK

A. If the Contractor considers any instructions by the Architect, Owner, BC Project Inspector, or public authority having jurisdiction to be contrary to the requirements of the Contract Documents and will involve extra work and/or cost under the Contract, the Contractor shall give the Architect written notice thereof within ten days after receipt of such instructions, and in any event before proceeding to execute such work. As used in this Article, "instructions" shall include written or oral clarifications, directions, instructions, interpretations, or determinations.

B. The Contractor's notification pursuant to Paragraph 20.A shall state: (1) the date, circumstances,

and source of the instructions, **(2)** that the Contractor considers the instructions to constitute a change to the Contract Documents and why, and **(3)** an estimate of extra cost and time that may be involved to the extent an estimate may be reasonably made at that time.

C. Except for claims relating to an emergency endangering life or property, no claim for extra cost or extra work shall be considered in the absence of prior notice required under Paragraph 20.A.

D. Within ten days of receipt of a notice pursuant to Paragraph 20.A, the Architect will respond in writing to the Contractor, stating one of the following:

(1) The cited instruction is rescinded.

(2) The cited instruction is a change in the Work and in which manner the Contractor is to proceed with procedures of Article 19, Changes in the Work.

(3) The cited instruction is reconfirmed, is not considered by the Architect to be a change in the Contract Documents, and the Contractor is to proceed with Work as instructed.

E. If the Architect's response to the Contractor is as in Paragraph 20.D(3), the Contractor shall proceed with the Work as instructed. If the Contractor continues to consider the instructions to constitute a change in the Contract Documents, the Contractor shall, within ten days after receiving the Architect's response, notify the Architect in writing that the Contractor intends to submit a claim pursuant to Article 24, Resolution of Claims and Disputes

ARTICLE 21
DIFFERING SITE CONDITIONS

A. DEFINITION

"Differing Site Conditions" are:

(1) subsurface or otherwise concealed physical conditions at the Project site which differ materially from those indicated in the Contract Documents, or

(2) unknown physical conditions at the Project site which are of an unusual nature, differing materially from conditions ordinarily encountered and generally recognized as inherent in construction activities of the character required by the Contract Documents.

B. PROCEDURES

If Differing Site Conditions are encountered, then the party discovering the condition shall promptly notify the other party before the condition is disturbed and in no event later than ten days after discovering the condition. Upon such notice and verification that a Differing Site Condition exists, the Architect will, with reasonable promptness and with the Owner's concurrence, make changes in the Drawings and/or Specifications as are deemed necessary to conform to the Differing Site Condition. Any increase or decrease in the Contract Sum or Contract Time that is warranted by the changes will be made as provided under Article 19, Changes in the Work. If the Architect determines a Differing Site Condition has not been encountered, the Architect shall notify the Owner and Contractor in writing, stating the reason for that determination.

ARTICLE 22
CLAIMS for DAMAGES

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

ARTICLE 23
DELAYS

A. A delay beyond the Contractor's control at any time in the commencement or progress of Work by an act or omission of the Owner, Architect, or any separate contractor or by labor disputes, unusual delay in deliveries, unavoidable casualties, fires, abnormal floods, tornadoes, or other cataclysmic events of nature, may entitle the Contractor to an extension of the Contract Time provided, however, that the Contractor shall, within ten days after the delay first occurs, give written notice to the Architect of the cause of the delay and its probable effect on progress of the entire Work.

B. Adverse weather conditions that are more severe than anticipated for the locality of the Work during any given month may entitle the Contractor to an extension of Contract Time provided, however;

(1) the weather conditions had an adverse effect on construction scheduled to be performed during the period in which the adverse weather occurred, which in reasonable sequence would have an effect on completion of the entire Work,

(2) the Contractor shall, within twenty-one days after the end of the month in which the delay occurs, give the Architect written notice of the delay that occurred during that month and its probable effect on progress of the Work, and

(3) within a reasonable time after giving notice of the delay, the Contractor provides the Architect with sufficient data to document that the weather conditions experienced were unusually severe for the locality of the Work during the month in question. Unless otherwise provided in the Contract Documents, data documenting unusually severe weather conditions shall compare actual weather conditions to the average weather conditions for the month in question during the previous five years as recorded by the National Oceanic and Atmospheric Administration (NOAA) or similar record-keeping entities.

C. Adjustments, if any, of the Contract Time pursuant to this Article shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract or, at closeout of the Contract, by mutual written agreement between the Contractor and Owner. The adjustment of the Contract Time shall not exceed the extent to which the delay extends the time required to complete the entire Work of the Contract.

D. The Contractor shall not be entitled to any adjustment of the Contract Sum for damage due to

delays claimed pursuant to this Article unless the delay was caused by the Owner or Architect and was either:

(1) the result of bad faith or active interference or

(2) beyond the contemplation of the parties and not remedied within a reasonable time after notification by the Contractor of its presence.

ARTICLE 24
RESOLUTION of CLAIMS and DISPUTES

A. APPLICABILITY of ARTICLE

(1) As used in this Article, "Claims and Disputes" include claims or disputes asserted by the Contractor, its Surety, or Owner arising out of or related to the Contract, or its breach, including without limitation claims seeking, under the provisions of the Contract, equitable adjustment of the Contract Sum or Contract Time and claims and disputes arising between the Contractor (or its Surety) and Owner regarding interpretation of the Contract Documents, performance of the Work, or breach of or compliance with the terms of the Contract.

(2) "Resolution" addressed in this Article applies only to Claims and Disputes arising between the Contractor (or its Surety) and Owner and asserted after execution of the Construction Contract and prior to the date upon which final payment is made. Upon making application for final payment the Contractor may reserve the right to subsequent Resolution of existing Claims by including a list of all Claims, in stated amounts, which remain to be resolved and specifically excluding them from any release of claims executed by the Contractor, and in that event Resolution may occur after final payment is made.

B. CONTINUANCE of PERFORMANCE

An unresolved Claim or Dispute shall not be just cause for the Contractor to fail or refuse to proceed diligently with performance of the Contract or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

C. GOOD FAITH EFFORT to SETTLE

The Contractor and Owner agree that, upon the assertion of a Claim by the other, they will make a good faith effort, with the Architect's assistance and advice, to achieve mutual resolution of the Claim. If mutually agreed, the Contractor and Owner may endeavor to resolve a Claim through mediation. If efforts to settle are not successful, the Claim shall be resolved in accordance with paragraph D or E below, whichever applies.

D FINAL RESOLUTION for STATE-FUNDED CONTRACTS

(1) If the Contract is funded in whole or in part with state funds, the final Resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner shall be by the Director, whose decision shall be final, binding, and conclusive upon the Contractor, its Surety, and the Owner.

(2) When it becomes apparent to the party asserting a Claim (the Claimant) that an impasse to

mutual resolution has been reached, the Claimant may request in writing to the Director that the Claim be resolved by decision of the Director. Such request by the Contractor (or its Surety) shall be submitted through the Owner. Should the Owner fail or refuse to submit the Contractor's request within ten days of receipt of same, the Contractor may forward such request directly to the Director. Upon receipt of a request to resolve a Claim, the Director will instruct the parties as to procedures to be initiated and followed.

(3) If the respondent to a Claim fails or refuses to participate or cooperate in the Resolution procedures to the extent that the Claimant is compelled to initiate legal proceedings to induce the Respondent to participate or cooperate, the Claimant will be entitled to recover, and may amend its Claim to include, the expense of reasonable attorney's fees so incurred.

E. FINAL RESOLUTION for LOCALLY-FUNDED CONTRACTS

If the Contract is funded in whole with funds provided by a city or county board of education or other local governmental authority and the Contract Documents do not stipulate a binding alternative dispute resolution method, the final resolution of Claims and Disputes which cannot be resolved by the Contractor (or its Surety) and Owner may be by any legal remedy available to the parties. Alternatively, upon the written agreement of the Contractor (or its Surety) and the Owner, final Resolution of Claims and Disputes may be by submission to binding arbitration before a neutral arbitrator or panel or by submission to the Director in accordance with preceding Paragraph D.

ARTICLE 25
OWNER'S RIGHT to CORRECT DEFECTIVE WORK

If the Contractor fails or refuses to correct Defective Work in a timely manner that will avoid delay of completion, use, or occupancy of the Work or work by the Owner or separate contractors, the Architect may give the Contractor written Notice to Cure the Defective Work within a reasonable, stated time. If within ten days after receipt of the Notice to Cure the Contractor has not proceeded and satisfactorily continued to cure the Defective Work or provided the Architect with written verification that satisfactory positive action is in process to cure the Defective Work, the Owner may, without prejudice to any other remedy available to the Owner, correct the Defective Work and deduct the actual cost of the correction from payment then or thereafter due to the Contractor.

ARTICLE 26
OWNER'S RIGHT to STOP or SUSPEND the WORK

A. STOPPING the WORK for CAUSE

If the Contractor fails to correct Defective Work or persistently fails to carry out Work in accordance with the Contract Documents, the Owner may direct the Contractor in writing to stop the Work, or any part of the Work, until the cause for the Owner's directive has been eliminated; however, the Owner's right to stop the Work shall not be construed as a duty of the Owner to be exercised for the benefit of the Contractor or any other person or entity.

B. SUSPENSION by the OWNER for CONVENIENCE

(1) The Owner may, at any time and without cause, direct the Contractor in writing to suspend, delay or interrupt the Work, or any part of the Work, for a period of time as the Owner may determine.

(2) The Contract Sum and Contract Time shall be adjusted, pursuant to Article 19, for reasonable increases in the cost and time caused by an Owner-directed suspension, delay or interruption of Work for the Owner's convenience. However, no adjustment to the Contract Sum shall be made to the extent that the same or concurrent Work is, was or would have been likewise suspended, delayed or interrupted for other reasons not caused by the Owner.

ARTICLE 27
OWNER'S RIGHT to TERMINATE CONTRACT

A. TERMINATION by the OWNER for CAUSE

(1) Causes: The Owner may terminate the Contractor's right to complete the Work, or any designated portion of the Work, if the Contractor:

(a) should be adjudged bankrupt, or should make a general assignment for the benefit of the Contractor's creditors, or if a receiver should be appointed on account of the Contractor's insolvency to the extent termination for these reasons is permissible under applicable law;

(b) refuses or fails to prosecute the Work, or any part of the Work, with the diligence that will insure its completion within the Contract Time, including any extensions, or fails to complete the Work within the Contract Time;

(c) refuses or fails to perform the Work, including prompt correction of Defective Work, in a manner that will insure that the Work, when fully completed, will be in accordance with the Contract Documents;

(d) fails to pay for labor or materials supplied for the Work or to pay Subcontractors in accordance with the respective Subcontract;

(e) persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction, or the instructions of the Architect or Owner; or

(f) is otherwise guilty of a substantial breach of the Contract.

(2) Procedure for Unbonded Construction Contracts (Generally, contracts less than $50,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor written notice to cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor written notice that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a seven day Notice of Termination

without giving the Contractor another Notice to Cure.

(d) At the expiration of the seven days of the termination notice, the Owner may:

.1 take possession of the site, of all materials and equipment stored on and off site, and of all Contractor-owned tools, construction equipment and machinery, and facilities located at the site, and

.2 finish the Work by whatever reasonable method the Owner may deem expedient.

(e) The Contractor shall not be entitled to receive further payment under the Contract until the Work is completed.

(f) If the Owner's cost of completing the Work, including correction of Defective Work, compensation for additional architectural, engineering, managerial, and administrative services, and reasonable attorneys' fees due to the default and termination, is less than the unpaid balance of the Contract Sum, the excess balance less liquidated damages for delay shall be paid to the Contractor. If such cost to the Owner including attorney's fees, plus liquidated damages, exceeds the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner. Final Resolution of any claim or Dispute involving the termination or any amount due any party as a result of the termination shall be pursuant to Article 24.

(g) Upon the Contractor's request, the Owner shall furnish to the Contractor a detailed accounting of the Owner's cost of completing the Work.

(3) Procedure for Bonded Construction Contracts (Generally, contracts over $50,000):

(a) Notice to Cure: In the presence of any of the above conditions the Architect may give the Contractor and its Surety written Notice to Cure the condition within a reasonable, stated time, but not less than ten days after the Contractor receives the notice.

(b) Notice of Termination: If, at the expiration of the time stated in the Notice to Cure, the Contractor has not proceeded and satisfactorily continued to cure the condition or provided the Architect with written verification that satisfactory positive action is in process to cure the condition, the Owner may, without prejudice to any other rights or remedies of the Owner, give the Contractor and its Surety written notice declaring the Contractor to be in default under the Contract and stating that the Contractor's right to complete the Work, or a designated portion of the Work, shall terminate seven days after the Contractor's receipt of the written Notice of Termination.

(c) If the Contractor satisfies a Notice to Cure, but the condition for which the notice was first given reoccurs, the Owner may give the Contractor a Notice of Termination without giving the Contractor another Notice to Cure.

(d) Demand on the Performance Bond: With the Notice of Termination the Owner shall give the Surety a written demand that, upon the effective date of the Notice of Termination, the Surety promptly fulfill its obligation to take charge of and complete the Work in accordance with the terms of the Performance Bond.

(e) Surety Claims: Upon receiving the Owner's demand on the Performance Bond, the Surety shall assume all rights and obligations of the Contractor under the Contract. However, the Surety shall also have the right to assert "Surety Claims" to the Owner, which are defined as claims relating to acts or omissions of the Owner or Architect prior to termination of the Contractor which may have prejudiced its rights as Surety or its interest in the unpaid balance of the Contract Sum. If the Surety wishes to assert a Surety Claim, it shall give the Owner, through the Architect, written notice within twenty-one days after first recognizing the condition giving rise to the Surety Claim. The Surety Claim shall then be submitted to the Owner, through the Architect, no later than sixty days after giving notice thereof, but no such Surety Claims shall be considered if submitted after the date upon which final payment

becomes due. Final resolution of Surety Claims shall be pursuant to Article 24, Resolution of Claims and Disputes. The presence or possibility of a Surety Claim shall not be just cause for the Surety to fail or refuse to take charge of and complete the Work or for the Owner to fail or refuse to continue to make payments in accordance with the Contract Documents.

(f) Payments to Surety: The Surety shall be paid for completing the Work in accordance with the Contract Documents as if the Surety were the Contractor. The Owner shall have the right to deduct from payments to the Surety any reasonable costs incurred by the Owner, including compensation for additional architectural, engineering, managerial, and administrative services, and attorneys' fees as necessitated by termination of the Contractor and completion of the Work by the Surety. No further payments shall be made to the Contractor by the Owner. The Surety shall be solely responsible for any accounting to the Contractor for the portion of the Contract Sum paid to Surety by Owner or for the costs and expenses of completing the Work.

(4) Wrongful Termination: If any notice of termination by the Owner for cause, made in good faith, is determined to have been wrongly given, such termination shall be effective and compensation therefore determined as if it had been a termination for convenience pursuant to Paragraph B below.

B. TERMINATION by the OWNER for CONVENIENCE

(1) The Owner may, without cause and at any time, terminate the performance of Work under the Contract in whole, or in part, upon determination by the Owner that such termination is in the Owner's best interest. Such termination is referred to herein as Termination for Convenience.

(2) Upon receipt of a written notice of Termination for Convenience from the Owner, the Contractor shall:

(a) stop Work as specified in the notice;

(b) enter into no further subcontracts or purchase orders for materials, services, or facilities, except as may be necessary for Work directed to be performed prior to the effective date of the termination or to complete Work that is not terminated;

(c) terminate all existing subcontracts and purchase orders to the extent they relate to the terminated Work;

(d) take such actions as are necessary, or directed by the Architect or Owner, to protect, preserve, and make safe the terminated Work; and

(e) complete performance of the Work that is not terminated.

(3) In the event of Termination for Convenience, the Contractor shall be entitled to receive payment for the Work performed prior to its termination, including materials and equipment purchased and delivered for incorporation into the terminated Work, and any reasonable costs incurred because of the termination. Such payment shall include reasonable mark-up of costs for overhead and profit, not to exceed the limits stated in Article 19, Changes in the Work. The Contractor shall be entitled to receive payment for reasonable anticipated overhead ("home office") and shall not be entitled to receive payment for any profits anticipated to have been gained from the terminated Work. A proposal for decreasing the Contract Sum shall be submitted to the Architect by the Contractor in such time and detail, and with such supporting documentation, as is reasonably directed by the Owner. Final modification of the Contract shall be by Contract Change Order pursuant to Article 19. Any Claim or Dispute involving the termination or any amount due a party as a result shall be resolved pursuant to Article 24.

ARTICLE 28
CONTRACTOR'S RIGHT to SUSPEND or TERMINATE the CONTRACT

A. SUSPENSION by the OWNER

If all of the Work is suspended or delayed for the Owner's convenience or under an order of any court, or other public authority, for a period of sixty days, through no act or fault of the Contractor or a Subcontractor, or anyone for whose acts they may be liable, then the Contractor may give the Owner a written Notice of Termination which allows the Owner fourteen days after receiving the Notice in which to give the Contractor appropriate written authorization to resume the Work. Absent the Contractor's receipt of such authorization to resume the Work, the Contract shall terminate upon expiration of this fourteen day period and the Contractor will be compensated by the Owner as if the termination had been for the Owner's convenience pursuant to Article 27.B.

B. NONPAYMENT

The Owner's failure to pay the undisputed amount of an Application for Payment within sixty days after receiving it from the Architect (Certified pursuant to Article 30) shall be just cause for the Contractor to give the Owner fourteen days' written notice that the Work will be suspended pending receipt of payment but that the Contract shall terminate if payment is not received within fourteen days (or a longer period stated by the Contractor) of the expiration of the fourteen day notice period.

(1) If the Work is then suspended for nonpayment, but resumed upon receipt of payment, the Contractor will be entitled to compensation as if the suspension had been by the Owner pursuant to Article 26, Paragraph B.

(2) If the Contract is then terminated for nonpayment, the Contractor will be entitled to compensation as if the termination had been by the Owner pursuant to Article 27, Paragraph B.

ARTICLE 29
PROGRESS PAYMENTS

A. FREQUENCY of PROGRESS PAYMENTS

Unless otherwise provided in the Contract Documents, the Owner will make payments to the Contractor as the Work progresses based on monthly estimates prepared and certified by the Contractor, approved and certified by the Architect, and approved by the Owner and other authorities whose approval is required.

B. SCHEDULE of VALUES

Within ten days after receiving the Notice to Proceed the Contractor shall submit to the Architect a Schedule of Values, which is a breakdown of the Contract Sum showing the value of the various

parts of the Work for billing purposes. The Schedule of Values shall be prepared on 81/2" × 11" paper in a format that is acceptable to the Architect and Owner and shall divide the Contract Sum into as many parts ("line items") as the Architect and Owner determine necessary to permit evaluation and to show amounts attributable to Subcontractors. The Contractor's overhead and profit are to be proportionately distributed throughout the line items of the Schedule of Values. Upon approval, the Schedule of Values shall be used as a basis for monthly Applications for Payment, unless it is later found to be in error. Approved change order amounts shall be added to or incorporated into the Schedule of Values as mutually agreed by the Contractor and Architect.

C. APPLICATIONS for PAYMENTS

(1) Based on the approved Schedule of Values, each monthly Application for Payment shall show the Contractor's estimate of the value of Work performed in each line item as of the end of the billing period. The Contractor's cost of materials and equipment not yet incorporated into the Work, but delivered and suitably stored on the site, may be considered in monthly Applications for Payment.

(2) The Contractor's estimate of the value of Work performed and stored materials must represent such reasonableness as to warrant certification by the Architect to the Owner in accordance with Article 30. Each monthly Application for Payment shall be supported by such data as will substantiate the Contractor's right to payment, including without limitation copies of requisitions from subcontractors and material suppliers.

(3) If no other date is stated in the Contract Documents or agreed upon by the parties, each monthly Application for Payment shall be submitted to the Architect on or about the first day of each month and payment shall be issued to the Contractor within thirty days after an Application for Payment is Certified pursuant to Article 30 and delivered to the Owner

D. MATERIALS STORED OFF SITE

Unless otherwise provided in the Contract Documents, the Contractor's cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

(1) the contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location;

(2) a Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party;

(3) the Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner;

(4) the materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner; and

(5) compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest.

E. RETAINAGE

(1) "Retainage" is defined as the money earned and, therefore, belonging to the Contractor (subject to final settlement of the Contract) which has been retained by the Owner conditioned on final completion and acceptance of all Work required by the Contract Documents. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(2) In making progress payments the Owner shall retain five percent of the estimated value of Work performed and the value of the materials stored for the Work; but after retainage has been held upon fifty percent of the Contract Sum, no additional retainage will be withheld.

F. CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's notarized certification that, to the best of the Contractor's knowledge, information, and belief, the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payments were issued and payments received from the Owner and that the current payment shown in the Application for Payment has not yet been received.

(2) By making this certification the Contractor represents to the Architect and Owner that, upon receipt of previous progress payments from the Owner, the Contractor has promptly paid each Subcontractor, in accordance with the terms of its agreement with the Subcontractor, the amount due the Subcontractor from the amount included in the progress payment on account of the Subcontractor's Work and stored materials. The Architect and Owner may advise Subcontractors and suppliers regarding percentages of completion or amounts requested and/or approved in an Application for Payment on account of the Subcontractor's Work and stored materials.

G. PAYMENT ESTABLISHES OWNERSHIP

All material and Work covered by progress payments shall become the sole property of the Owner, but the Contractor shall not be relieved from the sole responsibility for the care and protection of material and Work upon which payments have been made and for the restoration of any damaged material and Work.

ARTICLE 30
CERTIFICATION and APPROVALS for PAYMENT

A. The Architect's review, approval, and certification of Applications for Payment shall be based on the Architect's general knowledge of the Work obtained through site visits and the information provided by the Contractor with the Application. The Architect shall not be required to perform exhaustive examinations, evaluations, or estimates of the cost of completed or uncompleted Work or stored materials to verify the accuracy of amounts requested by the Contractor, but the Architect shall have the authority to adjust the Contractor's estimate when, in the Architect's reasonable opinion, such estimates are overstated or understated.

B. Within seven days after receiving the Contractor's monthly Application for Payment, or such other

time as may be stated in the Contract Documents, the Architect will take one of the following actions:

(1) The Architect will approve and certify the Application as submitted and forward it as a Certification for Payment for approval by the Owner (and other approving authorities, if any) and payment.

(2) If the Architect takes exception to any amounts claimed by the Contractor and the Contractor and Architect cannot agree on revised amounts, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to certify to the Owner, transmitting a copy of same to the Contractor.

(3) To the extent the Architect determines may be necessary to protect the Owner from loss on account of any of the causes stated in Article 31, the Architect may subtract from the Contractor's estimates and will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due and notify the Contractor and Owner in writing of the Architect's reasons for withholding payment in whole or in part.

C. Neither the Architect's issuance of a Certificate for Payment nor the Owner's resulting progress payment shall be a representation to the Contractor that the Work in progress or completed at that time is accepted or deemed to be in conformance with the Contract Documents.

D. The Architect shall not be required to determine that the Contractor has promptly or fully paid Subcontractors and suppliers or how or for what purpose the Contractor has used monies paid under the Construction Contract. However, the Architect may, upon request and if practical, inform any Subcontractor or supplier of the amount, or percentage of completion, approved or paid to the Contractor on account of the materials supplied or the Work performed by the Subcontractor.

ARTICLE 31
PAYMENTS WITHHELD

A. The Architect may nullify or revise a previously issued Certificate for Payment prior to Owner's payment thereunder to the extent as may be necessary in the Architect's opinion to protect the Owner from loss on account of any of the following causes not discovered or fully accounted for at the time of the certification or approval of the Application for Payment:

(1) Defective Work;
(2) filed, or reasonable evidence indicating probable filing of, claims arising out of the Contract by other parties against the Contractor;
(3) the Contractor's failure to pay for labor, materials or equipment or to pay Subcontractors;
(4) reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
(5) damage suffered by the Owner or another contractor caused by the Contractor, a Subcontractor, or anyone for whose acts they may be liable;
(6) reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance is insufficient to cover applicable liquidated damages; or
(7) the Contractor's persistent failure to conform to the requirements of the Contract Documents.

B. If the Owner deems it necessary to withhold payment pursuant to preceding Paragraph A, the

Owner will notify the Contractor and Architect in writing of the amount to be withheld and the reason for same.

C. The Architect shall not be required to withhold payment for completed or partially completed Work for which compliance with the Contract Documents remains to be determined by Specified Inspections or Final Inspections to be performed in their proper sequence. However, if Work for which payment has been approved, certified, or made under an Application for Payment is subsequently determined to be Defective Work, the Architect shall determine an appropriate amount that will protect the Owner's interest against the Defective Work.

(1) If payment has not been made against the Application for Payment first including the Defective Work, the Architect will notify the Owner and Contractor of the amount to be withheld from the payment until the Defective Work is brought into compliance with the Contract Documents.

(2) If payment has been made against the Application for Payment first including the Defective Work, the Architect will withhold the appropriate amount from the next Application for Payment submitted after the determination of noncompliance, such amount to then be withheld until the Defective Work is brought into compliance with the Contract Documents.

D. The amount withheld will be paid with the next Application for Payment certified and approved after the condition for which the Owner has withheld payment is removed or otherwise resolved to the Owner's satisfaction.

E. The Owner shall have the right to withhold from payments due the Contractor under this Contract an amount equal to any amount which the Contractor owes the Owner under another contract.

ARTICLE 32
SUBSTANTIAL COMPLETION

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work ("punch list" items). Substantial Completion of the Work, or a designated portion of the Work, is not achieved until so agreed in a Certificate of Substantial Completion signed by the Contractor, Architect, Owner, and Technical Staff of the Alabama Building Commission.

B. The Contractor shall notify the Architect in writing when it considers the Work, or a portion of the Work which the Owner has agreed to accept separately, to be substantially complete and ready for a Final Inspection pursuant to Article 16. In this notification the Contractor shall identify any items remaining to be completed or corrected for Final Acceptance prior to final payment.

C. Substantial Completion is achieved and a Final Inspection is appropriate only when a minimal number of punch list items exists and only a short period of time will be required to correct or complete them. Upon receipt of the Contractor's notice for a Final Inspection, the Architect will advise the Contractor in writing of any conditions of the Work which the Architect or Owner is aware do not constitute Substantial Completion, otherwise, a Final Inspection will proceed within a

reasonable time after the Contractor's notice is given. However, the Architect will not be required to prepare lengthy listings of punch list items; therefore, if the Final Inspection discloses that Substantial Completion has not been achieved, the Architect may discontinue or suspend the inspection until the Contractor does achieve Substantial Completion.

D. CERTIFICATE of SUBSTANTIAL COMPLETION

(1) When the Work or a designated portion of the Work is substantially complete, the Architect will prepare and sign a Certificate of Substantial Completion to be signed in order by the Contractor, Owner, and Alabama Building Ccommission.

(2) When signed by all parties, the Certificate of Substantial Completion shall establish the Date of Substantial Completion which is the date upon which:

(a) the Work, or designated portion of the Work, is accepted by the Architect, Owner, and Alabama Building Commission as being ready for occupancy,

(b) the Contractor's one-year and special warranties for the Work covered by the Certificate commence, unless stated otherwise in the Certificate (the one-year warranty for punch list items completed or corrected after the period allowed in the Certificate shall commence on the date of their Final Acceptance) , and

(c) Owner becomes responsible for building security, maintenance, utility services, and insurance, unless stated otherwise in the Certificate.

(3) The Certificate of Substantial Completion shall set the time within which the Contractor shall finish all items on the "punch list" accompanying the Certificate. The completion of punch list items shall be a condition precedent to Final Payment.

(4) If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor's (5-year) Roofing Guarantee, ABC Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion. The Alabama Building Commission will not sign the Certificate of Substantial Completion in the absence of the roofing guarantees.

E. The Date of Substantial Completion of the Work, as set in the Certificate of Substantial Completion of the Work or of the last completed portion of the Work, establishes the extent to which the Contractor is liable for Liquidated Damages, if any; however, should the Contractor fail to complete all punch list items within thirty days, or such other time as may be stated in the respective Certificate of Substantial Completion, the Contractor shall bear any expenses, including additional Architectural services and expenses, incurred by the Owner as a result of such failure to complete punch list items in a timely manner.

ARTICLE 33
OCCUPANCY or USE PRIOR to COMPLETION

A. UPON SUBSTANTIAL COMPLETION

Prior to completion of the entire Work, the Owner may occupy or begin utilizing any designated

portion of the Work on the agreed Date of Substantial Completion of that portion of the Work.

B. BEFORE SUBSTANTIAL COMPLETION

(1) The Owner shall not occupy or utilize any portion of the Work before Substantial Completion of that portion has been achieved.

(2) The Owner may deliver furniture and equipment and store, or install it in place ready for occupancy and use, in any designated portion of the Work before it is substantially completed under the following conditions:

(a) The Owner's storage or installation of furniture and equipment will not unreasonably disrupt or interfere with the Contractor's completion of the designated portion of the Work.

(b) The Contractor consents to the Owner's planned action (such consent shall not be unreasonably withheld).

(c) The Owner shall be responsible for insurance coverage of the Owner's furniture and equipment, and the Contractor's liability shall not be increased.

(d) The Contractor, Architect, and Owner will jointly inspect and record the condition of the Work in the area before the Owner delivers and stores or installs furniture and equipment; the Owner will equitably compensate the Contractor for making any repairs to the Work that may subsequently be required due to the Owner's delivery and storage or installation of furniture and equipment.

(e) The Owner's delivery and storage or installation of furniture and equipment shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the Contract Documents.

ARTICLE 34
FINAL PAYMENT

A. PREREQUISITES to FINAL PAYMENT

The following conditions are prerequisites to Final Payment becoming due the Contractor:

(1) Full execution of a Certificate of Substantial Completion for the Work, or each designated portion of the Work.

(2) Final Acceptance of the Work.

(3) The Contractor's completion, to the satisfaction of the Architect and Owner, of all documentary requirements of the Contract Documents; such as delivery of "as-built" documents, operating and maintenance manuals, warranties, etc.

(4) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect.

(5) Completion of an Advertisement for Completion pursuant to Paragraph C below.

(6) Delivery by the Contractor to the Owner through the Architect of a Release of Claims and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below.

(7) Consent of Surety, if any, to Final Payment to Contractor.

(8) Delivery by the Contractor to the Architect and Owner of other documents, if any, required by the Contract Documents as prerequisites to Final Payment.

B. FINAL ACCEPTANCE of the WORK

"Final Acceptance of the Work" shall be achieved when all "punch list" items recorded with the Certificate(s) of Substantial Completion are accounted for by either: **(1)** their completion or correction by the Contractor and acceptance by the Architect, Owner, and BC Project Inspector, or **(2)** their resolution under Article 18, Deductions for Uncorrected Work.

C. ADVERTISEMENT for COMPLETION

(1) If the Contract Sum is less than $50,000: The Owner, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion published one time in a newspaper of general circulation, published in the county in which the Owner is located and shall post notice of completion of the Contract on the Owner's bulletin board for one week, and shall require the Contractor to certify under oath that all bills have been paid in full. Final payment may be made at any time after the notice has been posted for one entire week.

(2) If the Contract Sum is more than $50,000: The Contractor, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion, similar to the sample contained in the Project Manual, published for a period of four successive weeks in some newspaper of general circulation published within the city or county where the Work was performed. Proof of publication of the Advertisement for Completion, in duplicate, shall be made by the Contractor to the Architect by affidavit of the publisher and a printed copy of the Advertisement for Completion published, in duplicate. If no newspaper is published in the county where the work was done, the notice may be given by posting at the Court House for thirty days and proof of same made by Probate Judge or Sheriff and the Contractor. Final payment shall not be due until thirty days after this public notice is completed.

D. RELEASE of CLAIMS

The Release of Claims and other documents referenced in Paragraph A(6) above are as follows:

(1) A release executed by Contractor of all claims and claims of lien against the Owner arising under and by virtue of the Contract, other than such claims of the Contractor, if any, as may have been previously made in writing and as may be specifically excepted by the Contractor from the operation of the release in stated amounts to be set forth therein.

(2) An affidavit under oath, if required, stating that so far as the Contractor has knowledge or information, there are no claims or claims of lien which have been or will be filed by any Subcontractor, Supplier or other party for labor or material for which a claim or claim of lien could be filed.

(3) A release, if required, of all claims and claims of lien made by any Subcontractor, Supplier or other party against the Owner or unpaid Contract funds held by the Owner arising under or related to the Work on the Project; provided, however, that if any Subcontractor, Supplier or others refuse to furnish a release of such claims or claims of lien, the Contractor may furnish a bond executed by Contractor and its Surety to the Owner to provide an unconditional obligation to defend, indemnify

and hold harmless the Owner against any loss, cost or expense, including attorney's fees, arising out of or as a result of such claims, or claims of lien, in which event Owner may make Final Payment notwithstanding such claims or claims of lien. If Contractor and Surety fail to fulfill their obligations to Owner under the bond, the Owner shall be entitled to recover damages as a result of such failure, including all costs and reasonable attorney's fees incurred to recover such damages.

E. EFFECT of FINAL PAYMENT

(1) The making of Final Payment shall constitute a waiver of Claims by the Owner except those arising from:

- **(a)** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- **(b)** failure of the Work to comply with the requirements of the Contract Documents;
- **(c)** terms of warranties or indemnities required by the Contract Documents, or
- **(d)** latent defects.

(2) Acceptance of Final Payment by the Contractor shall constitute a waiver of claims by Contractor except those previously made in writing, identified by Contractor as unsettled at the time of final Application for Payment, and specifically excepted from the release provided for in Paragraph D(1), above.

ARTICLE 35
CONTRACTOR'S WARRANTY

A. GENERAL WARRANTY

The Contractor warrants to the Owner and Architect that all materials and equipment furnished under the Contract will be of good quality and new, except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise, and that none of the Work will be Defective Work as defined in Article 1.

B. ONE-YEAR WARRANTY

(1) If, within one year after the date of Substantial Completion of the Work or each designated portion of the Work (or otherwise as agreed upon in a mutually-executed Certificate of Substantial Completion), any of the Work is found to be Defective Work, the Contractor shall promptly upon receipt of written notice from the Owner or Architect, and without expense to either, replace or correct the Defective Work to conform to the requirements of the Contract Documents, and repair all damage to the site, the building and its contents which is the result of Defective Work or its replacement or correction.

(2) The one-year warranty for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The one-year warranty for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion, and other Work performed after Substantial Completion, shall begin on the date of Final

Acceptance of the Work. The Contractor's correction of Work pursuant to this warranty does not extend the period of the warranty. The Contractor's one-year warranty does not apply to defects or damages due to improper or insufficient maintenance, improper operation, or wear and tear during normal usage.

(3) Upon recognizing a condition of Defective Work, the Owner shall promptly notify the Contractor of the condition. If the condition is causing damage to the building, its contents, equipment, or site, the Owner shall take reasonable actions to mitigate the damage or its continuation, if practical. If the Contractor fails to proceed promptly to comply with the terms of the warranty, or to provide the Owner with satisfactory written verification that positive action is in process, the Owner may have the Defective Work replaced or corrected and the Contractor and the Contractor's Surety shall be liable for all expense incurred.

(4) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one-year warranty period(s). The subsequent delivery of the Architect's report of a Year-end Inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(5) The Contractor's warranty of one year is in addition to, and not a limitation of, any other remedy stated herein or available to the Owner under applicable law.

C. GENERAL CONTRACTOR'S ROOFING GUARANTEE

(1) In addition to any other roof related warranties or guarantees that may be specified in the Contract Documents, the roof and associated work shall be guaranteed by the General Contractor against leaks and defects of materials and workmanship for a period of five (5) years, starting on the Date of Substantial Completion of the Project as stated in the Certificate of Substantial Completion. This guarantee for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The guarantee for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion shall begin on the date of Final Acceptance of the Work.

(2) The "General Contractor's Roofing Guarantee" (ABC Form C-9), included in the Project Manual, shall be executed in triplicate, signed by the appropriate party and submitted to the Architect for submission with the Certificate of Substantial Completion to the Owner and the Building Commission.

(3) This guarantee does not include costs which might be incurred by the General Contractor in making visits to the site requested by the Owner regarding roof problems that are due to lack of proper maintenance (keeping roof drains and/or gutters clear of debris that cause a stoppage of drainage which results in water ponding, overflowing of flashing, etc.), or damages caused by vandalism or misuse of roof areas. Should the contractor be required to return to the job to correct problems of this nature that are determined not to be related to faulty workmanship and materials in the installation of the roof, payment for actions taken by the Contractor in response to such request will be the responsibility of the Owner. A detailed written report shall be made by the General Contractor on each of these 'Service Calls' with copies to the Architect, Owner and Building

Commission.

D. SPECIAL WARRANTIES

(1) The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

(2) The Contractor and the Contractor's Surety shall be liable to the Owner for such special warranties during the Contractor's one-year warranty; thereafter, the Contractor's obligations relative to such special warranties shall be to provide reasonable assistance to the Owner in their enforcement.

E. ASSUMPTION of GUARANTEES of OTHERS

If the Contractor disturbs, alters, or damages any work guaranteed under a separate contract, thereby voiding the guarantee of that work, the Contractor shall restore the work to a condition satisfactory to the Owner and shall also guarantee it to the same extent that it was guaranteed under the separate contract.

ARTICLE 36
INDEMNIFICATION AGREEMENT

To the fullest extent permitted by law, the Contractor shall defend, indemnify, and hold harmless the Owner, Architect, Architect's consultants, Alabama Building Commission, State Department of Education (if applicable), and their agents, employees, and consultants (hereinafter collectively referred to as the "Indemnitees") from and against all claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of, related to, or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, including loss of use resulting therefrom, and is caused in whole or in part by negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether such claim, damage, loss or expense is caused in part, or is alleged but not legally established to have been caused in whole or in part by the negligence or other fault of a party indemnified hereunder.

A. This indemnification shall extend to all claims, damages, losses and expenses for injury or damage to adjacent or neighboring property, or persons injured thereon, that arise out of, relate to, or result from performance of the Work.

B. This indemnification does not extend to the liability of the Architect, or the Architect's Consultants, agents, or employees, arising out of **(1)** the preparation or approval of maps, shop drawings, opinions, reports, surveys, field orders, Change Orders, drawings or specifications, or **(2)** the giving of or the failure to give directions or instructions, provided such giving or failure to give instructions is the primary cause of the injury or damage.

C. This indemnification does not apply to the extent of the sole negligence of the Indemnitees.

ARTICLE 37
CONTRACTOR'S and SUBCONTRACTORS' INSURANCE

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work, whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified self-insureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract. The insurance certificate must provide the following:

- **(a)** Name and address of authorized agent of the insurance company
- **(b)** Name and address of insured
- **(c)** Name of insurance company or companies
- **(d)** Description of policies
- **(e)** Policy Number(s)
- **(f)** Policy Period(s)
- **(g)** Limits of liability
- **(h)** Name and address of Owner as certificate holder
- **(i)** Project Name and Number, if any
- **(j)** Signature of authorized agent of the insurance company
- **(k)** Telephone number of authorized agent of the insurance company

(l) Mandatory thirty day notice of cancellation / non-renewal / change

(5) MAXIMUM DEDUCTIBLE. Self-insured retention, except for qualified self-insurers or group self-insurers, in any policy shall not exceed $25,000.00.

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A self-insurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

.1 Bodily Injury by Accident - $1,000,000 each accident

.2 Bodily Injury by Disease - $1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
.1 General Aggregate	$ 2,000,000.00 per Project
.2 Products, Completed Operations Aggregate	$ 2,000,000.00 per Project
.3 Personal and Advertising Injury	$ 1,000,000.00 per Occurrence
.4 Each Occurrence	$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

.2 The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than $1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants, and employees as

additional insureds.

(4) COMMERCIAL UMBRELLA LIABILITY INSURANCE

(a) Commercial Umbrella Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial/Excess Umbrella Limits of:

.1 $ 5,000,000 per Occurrence

.2 $ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella Liability Insurance:

.1 The policy shall name the Owner, Architect, Alabama Building Commission, State Department of Education (if applicable), and their agents, consultants, and employees as additional insureds.

.2 The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

C. SUBCONTRACTORS' INSURANCE

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) LIABILITY INSURANCE. The Contractor shall require each Subcontractor to obtain and maintain adequate General Liability, Automobile Liability, and Umbrella Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion. However, in the case that the Work involves separate buildings, Builder's Risk coverage of each separate building may terminate on the Date of Substantial Completion as established in the Certificate of Substantial Completion issued for each building.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

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 performing construction or operations related to the Project, 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 covered by builder's risk insurance or other property insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall survive final acceptance and continue to apply to insured losses to the Work or other property on or adjacent to the Project.

PERFORMANCE and PAYMENT BONDS

A. GENERAL

Upon signing and returning the Construction Contract to the Owner for final approval and execution, the Contractor shall, at the Contractor's expense, furnish to the Owner a Performance Bond and a Payment Bond, each in a penal sum equal to 100% of the Contract Sum. Each bond shall be on the form contained in the Project Manual, shall be executed by a surety company (Surety) acceptable to the Owner and duly authorized and qualified to make such bonds in the State of Alabama in the required amounts, shall be countersigned by an authorized, Alabama resident agent of the Surety who is qualified to execute such instruments, and shall have attached thereto a power of attorney of the signing official.

The provisions of this Article are not applicable to this Contract if the Contract Sum is less than $50,000, unless bonds are required for this Contract in the Supplemental General Conditions.

B. PERFORMANCE BOND

Through the Performance Bond, the Surety's obligation to the Owner shall be to assure the prompt and faithful performance of the Contract and Contract Change Orders. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. In case of default on the part of the Contractor, the Surety shall take charge of and complete the Work in accordance with the terms of the Performance Bond. Any reasonable expenses incurred by the Owner as a result of default on the part of the Contractor, including architectural, engineering, administrative, and legal services, shall be recoverable under the Performance Bond.

C. PAYMENT BOND

Through the Payment Bond the Surety's obligation to the Owner shall be to guarantee that the Contractor and its Subcontractors shall promptly make payment to all persons supplying labor, materials, or supplies for, or in, the prosecution of the Work, including the payment of reasonable attorneys fees incurred by successful claimants or plaintiffs in civil actions on the Bond. Any person or entity indicating that they have a claim of nonpayment under the Bond shall, upon written request, be promptly furnished a certified copy of the Bond and Construction Contract by the Contractor, Architect, Owner, or Alabama Building Commission, whomever is recipient of the request.

D. CHANGE ORDERS

The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

E. EXPIRATION

The obligations of the Contractor's performance bond surety shall be coextensive with the contractor's performance obligations under the Contract Documents; provided, however, that the surety's obligation shall expire at the end of the one-year warranty period(s) of Article 35.

ARTICLE 39
ASSIGNMENT

The Contractor shall not assign the Contract or sublet it as a whole nor assign any moneys due or to become due to the Contractor thereunder without the previous written consent of the Owner (and of the Surety, in the case of a bonded Construction Contract). As prescribed by the Public Works Law, the Contract shall in no event be assigned to an unsuccessful bidder for the Contract whose bid was rejected because the bidder was not a responsible or responsive bidder.

ARTICLE 40
CONSTRUCTION by OWNER or SEPARATE CONTRACTORS

A. OWNER'S RESERVATION of RIGHT

(1) The Owner reserves the right to self-perform, or to award separate contracts for, other portions of the Project and other Project related construction and operations on the site. The contractual conditions of such separate contracts shall be substantially similar to those of this Contract, including insurance requirements and the provisions of this Article. If the Contractor considers such actions to involve delay or additional cost under this Contract, notifications and assertion of claims shall be as provided in Article 20 and Article 23.

(2) When separate contracts are awarded, the term "Contractor" in the separate Contract Documents shall mean the Contractor who executes the respective Construction Contract.

B. COORDINATION

Unless otherwise provided in the Contract Documents, the Owner shall be responsible for coordinating the activities of the Owner's forces and separate contractors with the Work of the Contractor. The Contractor shall cooperate with the Owner and separate contractors, shall participate in reviewing and comparing their construction schedules relative to that of the Contractor when directed to do so, and shall make and adhere to any revisions to the construction schedule resulting from a joint review and mutual agreement.

C. CONDITIONS APPLICABLE to WORK PERFORMED by OWNER

Unless otherwise provided in the Contract Documents, when the Owner self-performs construction or operations related to the Project, the Owner shall be subject to the same obligations to Contractor as Contractor would have to a separate contractor under the provision of this Article 40.

D. MUTUAL RESPONSIBILITY

(1) The Contractor shall reasonably accommodate the required introduction and storage of materials and equipment and performance of activities by the Owner and separate contractors and shall connect and coordinate the Contractor's Work with theirs as required by the Contract Documents.

(2) By proceeding with an element or portion of the Work that is applied to or performed on construction by the Owner or a separate contractor, or which relies upon their operations, the Contractor accepts the condition of such construction or operations as being suitable for the Contractor's Work, except for conditions that are not reasonably discoverable by the Contractor. If the Contractor discovers any condition in such construction or operations that is not suitable for the proper performance of the Work, the Contractor shall not proceed, but shall instead promptly notify the Architect in writing of the condition discovered.

(3) The Contractor shall reimburse the Owner for any costs incurred by a separate contractor and payable by the Owner because of acts or omissions of the Contractor. Likewise, the Owner shall be responsible to the Contractor for any costs incurred by the Contractor because of the acts or omissions of a separate contractor.

(4) The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without the written consent of the Owner and separate contractor; such consent shall not be unreasonably withheld. Likewise, the Contractor shall not unreasonably withhold its consent allowing the Owner or a separate contractor to cut or otherwise alter the Work.

(5) The Contractor shall promptly remedy any damage caused by the Contractor to the construction or property of the Owner or separate contractors**.**

ARTICLE 41
SUBCONTRACTS

A. AWARD of SUBCONTRACTS and OTHER CONTRACTS for PORTIONS of the WORK

(1) Unless otherwise provided in the Contract Documents, when delivering the executed Construction Contract, bonds, and evidence of insurance to the Architect, the Contractor shall also submit a listing of Subcontractors proposed for each principal portion of the Work and fabricators or suppliers proposed for furnishing materials or equipment fabricated to the design of the Contract Documents. This listing shall be in addition to any naming of Subcontractors, fabricators, or suppliers that may have been required in the bid process. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any Subcontractor, fabricator, or supplier proposed by the Contractor. The issuance of the Notice to Proceed in the absence of such objection by the Owner shall constitute notice that no reasonable objection to them is made.

(2) The Contractor shall not contract with a proposed Subcontractor, fabricator, or supplier to whom the Owner has made reasonable and timely objection. Except in accordance with prequalification procedures as may be contained in the Contract Documents, through specified qualifications, or on the grounds of reasonable objection, the Owner may not restrict the Contractor's selection of Subcontractors, fabricators, or suppliers.

(3) Upon the Owner's reasonable objection to a proposed Subcontractor, fabricator, or supplier, the Contractor shall promptly propose another to whom the Owner has no reasonable objection. If the proposed Subcontractor, fabricator, or supplier to whom the Owner made reasonable objection was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be equitably adjusted by Contract Change Order for any resulting difference if the Contractor has acted promptly and responsively in this procedure.

(4) The Contractor shall not change previously selected Subcontractors, fabricators, or suppliers without notifying the Architect and Owner in writing of proposed substitute Subcontractors, fabricators, or suppliers. If the Owner does not make a reasonable objection to a proposed substitute within three working days, the substitute shall be deemed approved.

B. SUBCONTRACTUAL RELATIONS

(1) The Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its subcontractors and material suppliers) to all the provisions of the Contract Documents as they apply to the Subcontractor's and material supplier's portion of the Work.

(2) Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner, nor to create a duty of the Architect, Owner, or Director to resolve disputes between or among the Contractor or its Subcontractors and suppliers or any other duty to such Subcontractors or suppliers.

ARTICLE 42
ARCHITECT'S STATUS

A. The Architect is an independent contractor performing, with respect to this Contract, pursuant to an agreement executed between the Owner and the Architect. The Architect has prepared the Drawings and Specifications and assembled the Contract Document and is, therefore, charged with their interpretation and clarification as described in the Contract Documents. As a representative of the Owner, the Architect will endeavor to guard the Owner against variances from the requirements of the Contract Documents by the Contractor. On behalf of the Owner, the Architect will administer the Contract as described in the Contract Documents during construction and the Contractor's one-year warranty.

B. So as to maintain continuity in administration of the Contract and performance of the Work, and to facilitate complete documentation of the project record, all communications between the Contractor and Owner regarding matters of or related to the Contract shall be directed through the Architect, unless direct communication is otherwise required to provide a legal notification. Unless otherwise authorized by the Architect, communications by and with the Architect's consultants shall be through the Architect. Unless otherwise authorized by the Contractor, communications by and with Subcontractors and material suppliers shall be through the Contractor.

C. ARCHITECT'S AUTHORITY

Subject to other provisions of the Contract Documents, the following summarizes some of the authority vested in the Architect by the Owner with respect to the Construction Contract and as further described or conditioned in other Articles of these General Conditions of the Contract.

(1) The Architect is authorized to:

(a) approve "minor" deviations as defined in Article 9, Submittals,
(b) make "minor" changes in the Work as defined in Article 19, Changes in the Work,
(c) reject or require the correction of Defective Work,
(d) require the Contractor to stop the performance of Defective Work,
(e) adjust an Application for Payment by the Contractor pursuant to Article 30, Certification and Approval of payments, and

(f) issue Notices to Cure pursuant to Article 27.

(2) The Architect is not authorized to:

(a) revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and changes) without concurrence of the Owner,

(b) finally approve or accept any portion of the Work without concurrence of the Owner,

(c) issue instructions contrary to the Contract Documents,

(d) issue Notice of Termination or otherwise terminate the Contract, or

(e) require the Contractor to stop the Work except only to avoid the performance of Defective Work.

D. LIMITATIONS of RESPONSIBILITIES

(1) The Architect shall not be responsible to Contractors or to others for supervising or coordinating the performance of the Work or for the Construction Methods or safety of the Work, unless the Contract Documents give other specific instructions concerning these matters.

(2) The Architect will not be responsible to the Contractor (nor the Owner) for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents or for acts or omissions of the Contractor, a Subcontractor, or anyone for whose acts they may be liable. However, the Architect will report to the Owner and Contractor any Defective Work recognized by the Architect.

(3) The Architect will endeavor to secure faithful performance by Owner and Contractor, and the Architect will not show partiality to either or be liable to either for results of interpretations or decisions rendered in good faith.

(4) The Contractor's remedies for additional time or expense arising out of or related to this Contract, or the breach thereof, shall be solely as provided for in the Contract Documents. The Contractor shall have no claim or cause of action against the Owner, Architect, or its consultants for any actions or failures to act, whether such claim may be in contract, tort, strict liability, or otherwise, it being the agreement of the parties that the Contractor shall make no claim against the Owner or any agents of the Owner, including the Architect or its consultants, except as may be provided for claims or disputes submitted in accordance with Article 24. The Architect and Architect's consultants shall be considered third party beneficiaries of this provision of the Contract and entitled to enforce same.

E. ARCHITECT'S DECISIONS

Decisions by the Architect shall be in writing The Architect's decisions on matters relating to aesthetic effect will be final and binding if consistent with the intent expressed in the Contract Documents. The Architect's decisions regarding disputes arising between the Contractor and Owner shall be advisory.

ARTICLE 43
CASH ALLOWANCES

A. All allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by allowances shall be supplied by the Contractor as directed by the Architect or Owner

and the Contractor shall afford the Owner the economy of obtaining competitive pricing from responsible bidders for allowance items unless other purchasing procedures are specified in the Contract Documents.

B. Unless otherwise provided in the Contract Documents:

(1) allowances shall cover the cost to the Contractor of materials and equipment delivered to the Project site and all applicable taxes, less applicable trade discounts;

(2) the Contractor's costs for unloading, storing, protecting, and handling at the site, labor, installation, overhead, profit and other expenses related to materials or equipment covered by an allowance shall be included in the Contract Sum but not in the allowances;

(3) if required, the Contract Sum shall be adjusted by Change Order to reflect the actual costs of an allowance.

C. Any selections of materials or equipment required of the Architect or Owner under an allowance shall be made in sufficient time to avoid delay of the Work.

ARTICLE 44
PERMITS, LAWS, and REGULATIONS

A. PERMITS, FEES AND NOTICES

(1) Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids.

(2) The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

B. TAXES

Unless stated otherwise in the Contract Documents, materials incorporated into the Work are exempt from sales and use tax pursuant to Section 40-9-33, Code of Alabama, 1975 as amended. The Contractor and its subcontractors shall be responsible for complying with rules and regulations of the Sales, Use, & Business Tax Division of the Alabama Department of Revenue regarding certificates and other qualifications necessary to claim such exemption when making qualifying purchases from vendors. The Contractor shall pay all applicable taxes that are not covered by the exemption of Section 40-9-33 and which are imposed as of the date of receipt of bids, including those imposed as of the date of receipt of bids but scheduled to go into effect after that date.

C. COMPENSATION for INCREASES

The Contractor shall be compensated for additional costs incurred because of increases in tax rates imposed after the date of receipt of bids.

ARTICLE 45
ROYALTIES, PATENTS, and COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants, Alabama Building Commission, State Department of Education (if applicable), and their agents, employees, and consultants from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of, related to, or resulting from all suits or claims for infringement of any patent rights or copyrights arising out of the inclusion of any patented or copyrighted materials, methods, or systems selected by the Contractor and used during the execution of or incorporated into the Work. This indemnification does not apply to any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods, or systems specified in the Contract Documents. However, if the Contractor has information that a specified material, method, or system is or may constitute an infringement of a patent or copyright, the Contractor shall be responsible for any resulting loss unless such information is promptly furnished to the Architect.

ARTICLE 46
USE of the SITE

A. The Contractor shall confine its operations at the Project site to areas permitted by the Owner and by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials, equipment, employees' vehicles, or debris. The Contractor's operations at the site shall be restricted to the sole purpose of constructing the Work, use of the site as a staging, assembly, or storage area for other business which the Contractor may undertake shall not be permitted.

B. Unless otherwise provided in the Contract Documents, temporary facilities, such as storage sheds, shops, and offices may be erected on the Project site with the approval of the Architect and Owner. Such temporary buildings and/or utilities shall remain the property of the Contractor, and be removed at the Contractor's expense upon completion of the Work, unless the Owner authorizes their abandonment without removal.

ARTICLE 47
CUTTING and PATCHING

A. The Contractor shall be responsible for all cutting, fitting, or patching that may be required to execute the Work to the results indicated in the Contract Documents or to make its parts fit together properly.

B. Any cutting, patching, or excavation by the Contractor shall be supervised and performed in a manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of the Owner or separate contractors.

ARTICLE 48
IN-PROGRESS and FINAL CLEANUP

A. IN-PROGRESS CLEAN-UP

(1) The Contractor shall at all times during the progress of the Work keep the premises and

surrounding area free from rubbish, scrap materials and debris resulting from the Work. Trash and combustible materials shall not be allowed to accumulate inside buildings or elsewhere on the premises. At no time shall any rubbish be thrown from window openings. Burning of trash and debris on site is not permitted.

(2) The Contractor shall make provisions to minimize and confine dust and debris resulting from construction activities.

B. FINAL CLEAN-UP

(1) Before Substantial Completion or Final Acceptance is achieved, the Contractor shall have removed from the Owner's property all construction equipment, tools, and machinery; temporary structures and/or utilities including the foundations thereof (except such as the Owner permits in writing to remain); rubbish, debris, and waste materials; and all surplus materials, leaving the site clean and true to line and grade, and the Work in a safe and clean condition, ready for use and operation.

(2) In addition to the above, and unless otherwise provided in the Contract Documents, the Contractor shall be responsible for the following special cleaning for all trades as the Work is completed:

(a) Cleaning of all painted, enameled, stained, or baked enamel work: Removal of all marks, stains, finger prints and splatters from such surfaces.

(b) Cleaning of all glass: Cleaning and removing of all stickers, labels, stains, and paint from all glass, and the washing and polishing of same on interior and exterior.

(c) Cleaning or polishing of all hardware: Cleaning and polishing of all hardware.

(d) Cleaning all tile, floor finish of all kinds: Removal of all splatters, stains, paint, dirt, and dust, the washing and polishing of all floors as recommended by the manufacturer or required by the Architect.

(e) Cleaning of all manufactured articles, materials, fixtures, appliances, and equipment: Removal of all stickers, rust stains, labels, and temporary covers, and cleaning and conditioning of all manufactured articles, material, fixtures, appliances, and electrical, heating, and air conditioning equipment as recommended or directed by the manufacturers, unless otherwise required by the Architect; blowing out or flushing out of all foreign matter from all equipment, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers, sanitizing potable water systems; and freeing identification plates on all equipment of excess paint and the polishing thereof.

C. OWNER'S RIGHT to CLEAN-UP

If the Contractor fails to comply with these clean-up requirements and then fails to comply with a written directive by the Architect to clean-up the premises within a specified time, the Architect or Owner may implement appropriate clean-up measures and the cost thereof shall be deducted from any amounts due or to become due the Contractor.

ARTICLE 49
LIQUIDATED DAMAGES

A. Time is the essence of the Contract. Any delay in the completion of the Work required by the

Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.

B. The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.

C. If a daily liquidated damage amount is not otherwise provided for in the Contract Documents, a time charge equal to six percent interest per annum on the total Contract Sum may be made against the Contractor for the entire period after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work.

D. The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

ARTICLE 50
USE of FOREIGN MATERIALS

A. In the performance of the Work the Contractor agrees to use materials, supplies, and products manufactured, mined, processed or otherwise produced in the United States or its territories, if same are available at reasonable and competitive prices and are not contrary to any sole source specification implemented under the Public Works Law.

B. In the performance of the Work the Contractor agrees to use steel produced in the United States if the Contract Documents require the use of steel and do not limit its supply to a sole source pursuant to the Public Works Law. If the Owner decides that the procurement of domestic steel products becomes impractical as a result of national emergency, national strike, or other cause, the Owner shall waive this restriction.

C. If domestic steel or other domestic materials, supplies, and products are not used in accordance with preceding Paragraphs A and B, the Contract Sum shall be reduced by an amount equal to any savings or benefits realized by the Contractor.

D. This Article applies only to Public Works projects financed entirely by the State of Alabama or any political subdivision of the state.

ARTICLE 51

PROJECT SIGN

(Not required for locally-funded SDE projects.)

If the Contract Sum (as awarded) is $100,000.00 or more, the Contractor shall furnish and erect a project sign as shown in "Detail of Project Sign" (ABC Form C-15) bound in the Project Manual. The project sign shall be erected in a prominent location selected by the Architect and Owner and shall be maintained in good condition until completion of Work. If the Contract involves Work on multiple sites, only one sign is required, which shall be erected on one of the sites in a location selected by the Architect and Owner.

END of
GENERAL CONDITIONS of the CONTRACT

SUPPLEMENT
to the
GENERAL CONDITIONS of the CONTRACT

1. Article 19 "Changes in the Work", Paragraph B (1) is modified as follows:

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that do not include overhead and profit shall be justified by the Architect, approved by the Owner, and must also be approved by the Director.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

2. Article 19 "Changes in the Work", Paragraph B (3) (f) is modified as follows:

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

(a) costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;

(b) cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;

(c) rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;

(d) costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;

(e) reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and

(f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that do not include overhead and profit shall be justified by the Architect, approved by the Owner, and must also be approved by the Director.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than

mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

END of SUPPLEMENT to the
GENERAL CONDITIONS of the CONTRACT

ATTACHMENT B
to the
GENERAL CONDITIONS of the CONTRACT

(MANDATORY FOR PROJECTS COVERED THROUGH THE STATE INSURANCE FUND (SIF))

1. Article 37 "Contractor's and Subcontractors' Insurance", Paragraph E is modified as follows:

E. WAIVER of SUBROGATION

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 performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance ~~or other property insurance~~ applicable to the Work or to the other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall ~~survive~~ not be applicable to loss or damage that occurs after final acceptance of the Work. ~~and continue to apply to insured losses to the Work or other property on or adjacent to the Project.~~

END of ATTACHMENT B to the
GENERAL CONDITIONS of the CONTRACT

SECTION 00050 — SUPPLEMENTAL CONDITIONS

The following supplements modify, change delete from or add to the "General Conditions of the Contract", Uniform Documents ABC Form C-8, dated August 2001 and the "Instructions to Bidders Form C-2". Where any Article of the General Conditions or Instructions to Bidders is modified or any Paragraph, Subparagraph, or Clause thereof is modified or deleted by these Modifications of the General Conditions or Instructions to Bidders, the unaltered Provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

1.1 ARTICLE 7: REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR:

A. Add the following Paragraph E. to Article 7:
   1. The Contractor shall verify and document with photographs existing conditions with the Owner prior to start of the Work. Provide two sets of reprints of the photographs to the Owner through the Engineer.

1.2 ARTICLE 19: CHANGES IN THE WORK:

A. Article 19 "Changes in the Work", Paragraph B (1) is modified as follows:
   1. **Lump Sum.** By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved, the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that does not include overhead and profit shall be justified by the Engineer, approved by the Owner, and must also be approved by the Director.** For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

B. Article 19 "Changes in the Work", Paragraph B (3) (f) is modified as follows:
   1. **Force Account.** By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:
      a) Costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;
      b) Cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;
      c) Cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed; rental cost of machinery and equipment, not to exceed prevailing local rates if contractor-owned;
      d) Costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;
      e) Reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups;
      f) for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. ~~No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner.~~ **Changes which involve a net credit to the Owner shall include credits for overhead and profit on the deducted work. Changes involving a net credit that does not**

include overhead and profit shall be justified by the Architect, approved by the Owner, and must also be approved by the Director. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

1.3 ARTICLE 37: CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE:

A. Article 37 "Contractor's and Subcontractor's Insurance", Paragraph E. is modified as follows:

1. WAIVERS of SUBROGATION

a) 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 Engineer, Engineer's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss. But said waiver shall apply only to the extent the loss or damage is covered by builder's risk insurance ~~or other property insurance~~ applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Engineer, Engineer's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall ~~survive~~ not be applicable to loss or damage that occurs after final acceptance of the Work. ~~And continue to apply to insured losses to the Work or other property on or adjacent to the Project.~~

1.4 ADD ARTICLE 52: ALABAMA IMMIGRATION LAW COMPLIANCE:

A. Alabama laws (see Title 31, Chapter 13 of the Code of Alabama 1975 and Act No. 2011- 535 as amended by 2012-491) require that, as a condition for the award of a contract by a school board to a business entity or employer with one or more employees working in Alabama, the business entity or employer must be provide documentation of enrollment in the E-Verify program with their contract or agreement. Furthermore, during the performance of the contract, the business entity or employer shall not violate federal immigration law or knowingly employ, hire for employment or continue to employ an unauthorized alien within the state of Alabama.

B. The following language will be included in the "Special Provisions" article of the ABC Form C-5, Construction Contract:

1. *"By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom."*

C. The Contractor will be required to include a copy of his E-Verify Memorandum of Understanding with the Construction Contract after bids are received and awarded to the low bidder.

D. If you do not believe these requirements are applicable to your entity, include an explanation justifying such exemption. An entity can obtain the E-Verify Memorandum of Understanding upon completion in the E-Verify enrollment process located at the federal web site www.uscis.gov/everify. The Alabama Department of

Homeland Security (http://immigration.alabama.gov) has also established an E-Verify employer agent account for any business entity or employer with 25 or fewer employees that will provide a participating business entity or employer with the required documentation of enrollment in the E-Verify program. An Employer Identification Number (EIN), also known as a Federal Tax Identification Number, is required to enroll in E-Verify or to establish an E-Verify employer agent account.

1.5 ADD ARTICLE 55: CONTRACT TIME LIMIT:

A. The Contract for the Work shall be completed within Forty-Five (45) consecutive calendar days from the date of Notice to Proceed, with extensions of time, if any, to be granted in accordance with Paragraph C of Article 19 of the General Conditions.

1.6 ITEM 8 – PREPARATION AND DELIVERY OF BIDS (Instructions to Bidders):

A. A Bid Bond is not required for this project.

END OF SECTION 00050

State of Alabama

Disclosure Statement

(Required by Act 2001-955)

ENTITY COMPLETING FORM

ADDRESS

CITY, STATE, ZIP

TELEPHONE NUMBER
( )

STATE AGENCY/DEPARTMENT THAT WILL RECEIVE GOODS, SERVICES, OR IS RESPONSIBLE FOR GRANT AWARD

ADDRESS

CITY, STATE, ZIP

TELEPHONE NUMBER
( )

This form is provided with:

☐ Contract ☐ Proposal ☐ Request for Proposal ☐ Invitation to Bid ☐ Grant Proposal

Have you or any of your partners, divisions, or any related business units previously performed work or provided goods to any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify below the State Agency/Department that received the goods or services, the type(s) of goods or services previously provided, and the amount received for the provision of such goods or services.

STATE AGENCY/DEPARTMENT	TYPE OF GOODS/SERVICES	AMOUNT RECEIVED

Have you or any of your partners, divisions, or any related business units previously applied and received any grants from any State Agency/Department in the current or last fiscal year?

☐ Yes ☐ No

If yes, identify the State Agency/Department that awarded the grant, the date such grant was awarded, and the amount of the grant.

STATE AGENCY/DEPARTMENT	DATE GRANT AWARDED	AMOUNT OF GRANT

1. List below the name(s) and address(es) of all public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF PUBLIC OFFICIAL/EMPLOYEE	ADDRESS	STATE DEPARTMENT/AGENCY

OVER

2. List below the name(s) and address(es) of all family members of public officials/public employees with whom you, members of your immediate family, or any of your employees have a family relationship and who may directly personally benefit financially from the proposed transaction. Identify the public officials/public employees and State Department/Agency for which the public officials/public employees work. (Attach additional sheets if necessary.)

NAME OF FAMILY MEMBER	ADDRESS	NAME OF PUBLIC OFFICIAL/ PUBLIC EMPLOYEE	STATE DEPARTMENT/ AGENCY WHERE EMPLOYED

If you identified individuals in items one and/or two above, describe in detail below the direct financial benefit to be gained by the public officials, public employees, and/or their family members as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

Describe in detail below any indirect financial benefits to be gained by any public official, public employee, and/or family members of the public official or public employee as the result of the contract, proposal, request for proposal, invitation to bid, or grant proposal. (Attach additional sheets if necessary.)

List below the name(s) and address(es) of all paid consultants and/or lobbyists utilized to obtain the contract, proposal, request for proposal, invitation to bid, or grant proposal:

NAME OF PAID CONSULTANT/LOBBYIST	ADDRESS

By signing below, I certify under oath and penalty of perjury that all statements on or attached to this form are true and correct to the best of my knowledge. I further understand that a civil penalty of ten percent (10%) of the amount of the transaction, not to exceed $10,000.00, is applied for knowingly providing incorrect or misleading information.

Signature Date

Notary's Signature Date Date Notary Expires

Act 2001-955 requires the disclosure statement to be completed and filed with all proposals, bids, contracts, or grant proposals to the State of Alabama in excess of $5,000.

ABC Form C-14
August 2001

FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, notice is hereby given that _____,
(*Contractor*)
Contractor, has completed the Contract for (Construction) (Renovation) (Alteration) (Equipment) (Improvement) of (*Name of Project*)

at _____

(*Insert location data in County or City*)
for the State of Alabama and the (County) (City) of _____,Owner(s), and have made request for final settlement of said Contract. All persons having any claim for labor, materials, or otherwise in connection with this project should immediately notify

_____
_____(*Architect*)

_____
(Contractor)

_____
(Business Address)

NOTE: This notice must be run once a week for four successive weeks for projects exceeding $50,000.00, for projects of less than $50,000.00, run one time only. Proof of publication is required.

GENERAL CONTRACTOR'S QUALIFICATIONS

PART 1 — GENERAL

1.1 QUALIFICATIONS OF PROSPECTIVE BIDDING GENERAL CONTRACTORS

Bidding General Contractors must meet the following minimum requirements prior to submitting a bid for this Project:

A. Bidders must be properly licensed under the laws governing their Work and be able to obtain insurance and bonds required for the Work.
B. General Construction shall be the primary business of bidding General Contractors.
C. Documented experience on a minimum of three (3) projects of similar size, scope and type construction. Documentation, when requested, shall include the following:
    1. Name of project
    2. Date of completion
    3. General description of general contract work
    4. Approximate dollar value of installation
    5. Name of Architect of record
D. The bidder shall have an active license by the Alabama Licensing Board for General Contractors with a specialty in Building Construction and shall submit proof of license when requested. A local business permit or local general contracting license will not be considered sufficient. The required Alabama license shall not have "provisional" limitations.
E. The bidder shall have bonding capacity to bid the Work.
F. The bidder shall have practiced General Construction under his current business name for a minimum of five (5) consecutive years.
G. The Owner reserves the right to dismiss any General Contractor that he feels does not have sufficient experience or whose quality of work would not be in the best interest of the Owner.

PART 2 — PRODUCTS (NOT APPLICABLE)

PART 3 — EXECUTION (NOT APPLICABLE)

END OF SECTION

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE TO PROCEED

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:
	Effective Date of Contract:

TO CONTRACTOR:

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [_____, 20__].

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Agreement, [the date of Substantial Completion is _____, and the date of readiness for final payment is_____] ***or*** [the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____].

Before starting any Work at the Site, Contractor must comply with the following:
[Note any access limitations, security procedures, or other restrictions]

Owner**:**

Authorized Signature

By:

Title:

Date Issued:

Copy: Engineer

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see General Conditions.]*

Amendments to Owner's responsibilities: ☐ None ☐ As follows

Amendments to Contractor's responsibilities: ☐ None ☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: _____ (Authorized signature)	By: _____ Owner (Authorized Signature)	By: _____ Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

CONTRACTOR'S AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS

Project: (name and address)

To Owner: (name and address)

Contract for:

Contract Dated:

☐ Owner ☐ Engineer ☐ Contractor ☐ Surety ☐ Other_____

State of:

County of:

The undersigned hereby certifies that, except as listed below of exceptions, payment(s) have been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

Exceptions:

Supporting Documents Attached Hereto:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required.

   Indicate Attachment: [ ] Yes [ ] No

The following supporting documents should be attached hereto:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Sub-contractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens.

Contractor: (name and address)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

CONTRACTOR'S AFFIDAVIT OF RELEASE OF LIENS

Project: (name and address)

To Owner: (name and address)

Contract for:

Contract Dated:

☐ Owner ☐ Engineer ☐ Contractor ☐ Surety ☐ Other_____

State of:

County of:

The undersigned, pursuant to the General Conditions of the Contract, hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

Exceptions:

Supporting Documents Attached Hereto:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Sub-contractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Consent of Surety to Final Payment.

Contractor: (name and address)

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

CONSENT OF SURETY TO FINAL PAYMENT

Project: (name and address)

To Owner: (name and address)

Contract for:

Contract Dated:

☐ Owner ☐ Engineer ☐ Contractor ☐ Surety ☐ Other_____

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(name/address of Surety)

on bond of ,SURETY,
(name/address of Contractor)

,CONTRACTOR,
hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(name/address of Owner)

,OWNER,
as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the date and year)

Attest:

(Seal):

_____
(Surety)

_____
(Signature of authorized representative)

_____
(Printed name and title)

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01040 - PROJECT COORDINATION

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

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

1.2. SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
   1. Coordination.
   2. Administrative and supervisory personnel.
   3. General installation provisions.
   4. Cleaning and protection.

B. Progress meetings, coordination meetings and pre-installation conferences are included in Section "Project Meetings".

C. Requirements for the Contractor's Construction Schedule are included in Section "Submittals".

1.3. COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.
   1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
   2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
   1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of schedules.
   2. Installation and removal of temporary facilities.
   3. Delivery and processing of submittals.
   4. Progress meetings.
   5. Project Close-out activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
   1. Salvage materials and equipment involved in performance of, but not actually incorporated in the Work. Refer to other sections for disposition of salvaged materials that are designated as Owner's property.

1.4. SUBMITTALS

A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
   1. Show the interrelationship of components shown on separate Shop Drawings.
   2. Indicate required installation sequences.
   3. Comply with requirements contained in Section "Submittals."
   4. Refer to Division-15 Section "Basic Mechanical Requirements," and Division-16 Section "Basic Electrical Requirements" for specific coordination Drawing requirements for mechanical and electrical installations.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.

E. Recheck measurements and dimensions, before starting each installation.

F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.

G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Engineer for final decision.

3.2 CLEANING AND PROTECTION

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

B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High speed operation,
21. Improper lubrication,
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Excessive weathering.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft.
29. Vandalism.

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
   1. Requirements of this Section apply to mechanical and electrical installations. Refer to Division-15 and Division-16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 – EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
   1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.
   1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
   3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.
   4. Comply with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.
   5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
   1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.
   2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
   3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.
      a) Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.
   4. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01200 - PROJECT MEETINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
   1. Pre-construction conferences.
   2. Progress meetings.
   3. Coordination meetings.

1.3 PRE-CONSTRUCTION CONFERENCE

A. Schedule a preconstruction conference before starting construction, at a time convenient to the Owner and the Engineer, but no later than 15 days after execution of the Agreement. Hold the conference at the Project Site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

B. Attendees: Authorized representatives of the Owner and Engineer; the Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress, including the following:
   1. Tentative construction schedule.
   2. Critical work sequencing.
   3. Designation of responsible personnel.
   4. Procedures for processing field decisions and Change Orders.
   5. Procedures for processing Applications for Payment.
   6. Submittal of Shop Drawings, Product Data, and Samples.
   7. Preparation of record documents.
   8. Use of the premises.
   9. Parking availability.
   10. Office, work, and storage areas.
   11. Equipment deliveries and priorities.
   12. Safety procedures.
   13. First aid.
   14. Security.
   15. Housekeeping.
   16. Working hours.

D. Record significant discussions and agreements and disagreements of each conference, and the approved schedule. Promptly distribute the record of the meeting to everyone concerned, including the Owner and the Architect.

1.4 PROGRESS MEETINGS

A. Conduct progress meetings at the Project Site at regular intervals. Notify the Owner and the Engineer in advance of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.

B. Attendees: In addition to representatives of the Owner and the Engineer, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
   1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.
   2. Review the present and future needs of each entity present, including the following:
      a) Interface requirements.
      b) Time.
      c) Sequences.
      d) Status of submittals.
      e) Deliveries.
      f) Off-site fabrication problems.
      g) Access.
      h) Site utilization.
      i) Temporary facilities and services.
      j) Hours of work.
      k) Hazards and risks.
      l) Housekeeping.
      m) Quality and work standards.
      n) Change Orders.
      o) Documentation of information for payment requests.

D. Reporting: No later than 3 days after each meeting, distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
   1. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

1.5 COORDINATION MEETINGS

A. Conduct project coordination meetings at regular intervals convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special preinstallation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved.

C. Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01200

SECTION 01250 - CONTRACT MODIFICATION PROCEDURES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:
   1. "General Conditions of the Contract".

1.3 MINOR CHANGES IN THE WORK

A. Engineer may issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on "Engineer's Supplemental Instructions" forms.

1.4 PROPOSAL REQUESTS

A. Owner/Engineer-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Engineer are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
   3. Include a statement outlining reasons for the change and the effect of the change on the Work.
   4. Provide a complete description of the proposed change.
   5. Include a list of quantities of products required or eliminated and unit costs, with total amount of costs and credits to be made.
   6. Indicate applicable taxes, delivery charges, equipment rental, and contractor's overhead and profit.
   7. Include the number of days extension to the contract time requested to complete proposed change.
   8. Include materials lists, labor, overhead/profit and other justification from sub-contractors/vendors involved in proposed change.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, contractor may propose changes by submitting a request for a change to the owner thru the Engineer.
   1. Proposals for changes initiated by contractor are for consideration by Owner/Engineer and should not be implemented until written acceptance by Owner/Engineer it provided to contractor.
   2. As soon as latent or unforseen conditions become evident, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a) Include a statement outlining reasons for the change and the effect of the change on the Work.
      b) Provide a complete description of the proposed change.
      c) Include a list of quantities of products required or eliminated and unit costs, with total amount of costs and credits to be made.
      d) Indicate applicable taxes, delivery charges, equipment rental, and contractor's overhead and profit.
      e) Include the number of days extension to the contract time requested to complete proposed change.

f) Include materials lists, labor, overhead/profit and other justification from sub-contractors/vendors involved in proposed change.

1.5 EXTENSION OF CONTRACT TIME

A. Request for extension of contract time are to be made on Contractor Change order proposal form.
   1. Request for time extension due to weather or other delay must be accompanied by supporting documentation and according to General Conditions of the Contract.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Engineer may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01250

SECTION 01300 - SUBMITTALS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
   1. Shop Drawings.
   2. Product Data.

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
   1. Permits.
   2. Applications for payment.
   3. Performance and payment bonds.
   4. Insurance certificates.
   5. List of Subcontractors.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity. After submittals have been approved and processed, no deviation will be granted without monetary consideration for the Owner's benefit.
   2. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
      a) Allow minimum of two weeks for initial review.
      b) If an intermediate submittal is necessary, process the same as the initial submittal.
      c) Allow two weeks for reprocessing each submittal.
      d) No extension of Contract Time will be authorized because of failure to transmit submittals to the Engineer sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
   1. Include the following information on the label for processing and recording action taken.
      a) Project name.
      b) Date.
      c) Name and address of Engineer.
      d) Name and address of Contractor.
      e) Name and address of subcontractor.
      f) Name and address of supplier.
      g) Name of manufacturer.
      h) Number and title of appropriate Specification Section.
      i) Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Engineer using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
   1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.4 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
   1. Dimensions.
   2. Identification of products and materials included.
   3. Compliance with specified standards.
   4. Notation of coordination requirements.
   5. Notation of dimensions established by field measurement.
   6. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
   7. Submittal: Submit one correctable translucent reproducible print and three blue- or black-line print for the Engineer's review; the reproducible print will be returned.
      a) One of the prints returned shall be marked-up and maintained as a "Record Document".
   8. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.

1.5 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
   1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
      a) Manufacturer's printed recommendations.
      b) Compliance with recognized trade association standards.
      c) Compliance with recognized testing agency standards.
      d) Application of testing agency labels and seals.
      e) Notation of dimensions verified by field measurement.
      f) Notation of coordination requirements.
   2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
   3. Submittals: Submit 4 copies of each required submittal; submit 6 copies where required for maintenance manuals. The Engineer will retain one, and will return the other marked with action taken and corrections or modifications required.
      a) Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
   4. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
      a) Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
      b) Do not permit use of unmarked copies of Product Data in connection with construction.

1.6 ENGINEER'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Engineer will review each submittal, mark to indicate action taken, and return promptly.
   1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Engineer will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked.
   1. Do not permit submittals marked "Not Approved, Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
      a) Other Action: Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

NOT USED

END OF SECTION 01300

SECTION 01500 - TEMPORARY FACILITIES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including construction and support facilities, security and protection.

B. Temporary construction and support facilities required include but are not limited to:
   1. Temporary enclosures.
   2. Temporary Project identification signs and bulletin boards.
   3. Waste disposal services.
   4. Construction aids and miscellaneous services and facilities.

C. Security and protection facilities required include but are not limited to:
   1. Barricades, warning signs, lights.

1.3 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
   1. Building Code requirements.
   2. Health and safety regulations.
   3. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
   1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.

1.4 PROJECT CONDITIONS

A. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. General: Provide new materials; if acceptable to the Engineer, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for the use intended.

B. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
   1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
   2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
   3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

B. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

B. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.4 OPERATION, TERMINATION AND REMOVAL

A. Termination and Removal: Unless the Engineer requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of the Contractor.
   2. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
      a) Replace air filters and clean inside of ductwork and housings.
      b) Replace significantly worn parts and parts that have been subject to unusual operating

conditions.

c) Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01500

SECTION 01600 — PRODUCT REQUIREMENTS

PART 1 — GENERAL

1.1 GENERAL LIMITATIONS

A. Where possible, provide entire required quantity of each generic product, material or equipment from a single source; and, where not possible to do so, match separate procurements as closely as possible. To the extent the selection process is under Contractor's control, provide compatible products, material and equipment. Where available and complying with requirements, provide standard products which have been used previously and successfully in similar applications, and which are recommended by manufacturers for applications indicated.

1.2 PRODUCT SELECTION LIMITATION

A. Where single products or two or more products are named, it shall be understood as descriptive of a type or style of material required; other brands or makes of equal quality and utility may be bid on, subject to Engineer’s written approval issued five (5) days or more before date of bid opening.

B. The phrase "or equal" referred to throughout these Specifications shall mean that written approval of such materials must be obtained from the Engineer. Manufacturers desiring to submit bid for an "equal" must submit full data covering the product to the Engineer in ample time to be evaluated and a written approval issued by the Engineer no later than five (5) days prior to date of bid opening.

C. Compliance with Standards: Selection of product that complies with requirements, including applicable standards, is Contractor's option where no product names are indicated.

D. Performance Requirements: Selection of product that has been tested to show compliance with requirements, including indicated performances, is Contractor's option where no product names are indicated.

E. Prescriptive Requirements: Selection of product that has been certified by manufacturer to comply with requirements, including indicated performances, is Contractor's option where no product names are indicated.

PART 2 — PRODUCTS (NOT APPLICABLE)

PART 3 — EXECUTION (NOT APPLICABLE)

END OF SECTION 01600

SECTION 01700 - PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
   1. Inspection procedures.
   2. Project record document submittal.
   3. Operating and maintenance manual submittal.
   4. Submittal of warranties.
   5. Final cleaning.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
      a) If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
   2. Advise Owner of pending insurance change-over requirements.
   3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
   4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
   5. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
   6. Deliver tools, spare parts, extra stock, and similar items.
   7. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Submit minutes recorded at scheduled instructional meetings with Owner’s personnel as evidence of conducting the required meetings. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
   8. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued. If the contractor has requested a final inspection, and the Engineer finds the project not to be substantially complete, subsequent inspections to obtain substantial completion will be a cost to the contractor's responsibility and shall be deducted from the Contractor’s final Application for Payment.
   1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.
   2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting inspection for final acceptance and final payment, complete the following. List exceptions in the request.
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
   2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
   3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and the list has been endorsed and dated by the Contractor.
   4. Submit consent of surety to final payment.
   5. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Reinspection Procedure: The Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer.
   1. Upon completion of reinspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
   2. If necessary, reinspection will be repeated, the expense of such inspection(s) shall be the responsibility of the contractor and the cost shall be deducted from the final Application for Payment.

1.5 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
   2. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
   3. Note related Change Order numbers where applicable.
   4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation. Note related record drawing information and Product Data.
   1. Upon completion of the Work, submit record Specifications to the Engineer for the Owner's records.

D. Record Product Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.
   1. Upon completion of mark-up, submit complete set of record Product Data to the Engineer for the Owner's records.

E. Maintenance Manuals: Organize operating and maintenance data into suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:
   1. Emergency instructions.
   2. Spare parts list.
   3. Copies of warranties.
   4. Wiring diagrams.
   5. Inspection procedures.
   6. Shop Drawings and Product Data.
   7. Fixture lamping schedule.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.1 CLOSEOUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Record minutes of these meetings and submit to the Engineer. Include a detailed review of the following items:
   1. Maintenance manuals.
   2. Record documents.
   3. Spare parts and materials.
   4. Tools.
   5. Lubricants.
   6. Identification systems.
   7. Hazards.
   8. Cleaning.
   9. Warranties and bonds.
   10. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:
   1. Start-up.
   2. Shutdown.
   3. Emergency operations.
   4. Noise and vibration adjustments.
   5. Safety procedures.
   6. Economy and efficiency adjustments.
   7. Effective energy utilization.

3.2 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions and included in Section "Temporary Facilities".

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
   1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
      a) Remove labels that are not permanent labels.
      b) Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
      c) Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
      d) Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.
   1. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION 01700

DIVISION 22

PLUMBING

SECTION 221116 – DOMESTIC WATER PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Domestic Water Piping indicated on Drawings and specified herein.

1.3 SUBMITTALS

A. Product Data: Provide data on pipe materials and fittings. Provide manufacturers catalog information.

1.4 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State and Local plumbing code.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Copper Tubing:
   1. Mueller.
   2. Great Lakes Copper
   3. Cerro.

B. Copper Fittings:
   1. Mueller.
   2. Elkhart.
   3. NIBCO.

2.2 WATER PIPING, BURIED

A. Copper Tubing: ASTM B42, Type K, annealed.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: AWS A5.8, BCuP silver braze.

2.3 WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, solder, Grade 95TA.

2.4 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 3 Inches and Under:
   1. Ferrous pipe: Class 150 malleable iron threaded unions.
   2. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 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 flanges or unions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Install water piping to ASME B31.9.

I. Install sleeves for pipes passing through concrete and masonry walls, fire rated partition walls, and concrete floor and roof slabs.

3.4 ERECTION TOLERANCES

A. Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.5 TESTING

A. Test for leaks and defects in new piping and any parts of existing piping that have been altered, extended, or repaired.

B. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow standing for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.

END OF SECTION 221116

DIVISION 23

MECHANICAL

SECTION 230500 – BASIC MECHANICAL REQUIREMENTS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to Division 1 - General Requirements.

B. The section includes basic mechanical requirements covering the Contract Documents for HVAC/Mechanical Systems.

1.3 DESCRIPTION OF WORK

A. This section of the specifications is coordinated with and complimentary to certain "Instructions", "General Conditions", "Special Conditions", and all other relevant divisions of work. Applicable provisions of the General Conditions shall govern work under this heading as if written in full herein.

B. The Division 23 Specifications shall be considered to be all inclusive in their individual divisions of work and shall refer to and be a part of all applicable parts of the General Specifications whether bound with these specifications or whether handled as a separate document.

C. The Drawings and Specifications shall be considered complimentary one to the other so that materials or labor indicated, called for or implied by one and not the other shall be supplied as though called for by both.

1.4 EXPERIENCE OF BIDDERS

A. HVAC Systems shall be the primary business of bidder(s) under these Sections of the Specifications, and the bidder(s) shall have installed at least five (5) similar type and size projects.

B. The Contractor shall provide substantiating proof of the requirements listed above 5 days prior to project bid date to the Engineer. If the substantiating proof is not submitted and approved by the Engineer, the Contractor will not be allowed to bid or work on the project. Proof shall include all of the following:
   1. Name of project.
   2. Date of completion.
   3. General description of work performed.
   4. Approximate dollar value of HVAC installation.
   5. Name of project engineer.

C. The bidder(s) shall have an active license by the State of Alabama as a HVAC Systems Contractor and shall submit proof of license when requested. A local business permit or local contracting license will not be considered sufficient. Additionally, when the bidding amount exceeds $50,000, the Contractor shall be actively licensed by the State of Alabama as a General Contractor with specialty in HVAC Systems. The bidder shall have practiced as an HVAC Systems Contractor under his current business name for a minimum of five (5) consecutive years.

D. The Contractor shall have completed at least two projects of comparable size and scope without receipt of a Notice to Cure.

E. If Contractor has received a Notice to Cure on any project, that Contractor is excluded from performing work on this project.

F. The Contractor shall provide substantiating proof of these requirements during the submittal process. If substantiating proof is not submitted and approved, the contractor will be removed from the project.

G. This Contractor shall provide a payment and performance bond for their Work.

H. The Contractor's main construction and service office shall be located within 75 driving miles distance of the project site unless approval, 5 days prior to project bid date, has been issued in writing by the Engineer.

I. The General Contractor shall not purchase this Contractor's equipment, materials, etc. All materials, equipment, labor, etc. required to perform the Work herein shall be at the cost of this Contractor.

1.5 BASIS OF DESIGN

A. Manufacturers listed in the drawing schedules as "Basis of Design" shall be the basis of the contractors bid. The contractor may choose to supply equivalent equipment manufactured by other manufacturers named in the respective section of Division 23. Manufacturers not named in the respective section shall only be considered on a "Deduct Alternate" basis unless prior approved under the provisions of Division 1.

B. The system design is based on data provided by the manufacturer listed as "Basis of Design". If one of the other manufacturers is used, Contractor must provide data that deviates from the design (i.e. electrical requirements, physical size, etc.) to other trades and the design Engineer. Any cost incurred by other trades, shall be the responsibility of this Contractor.

1.6 DRAWINGS AND SPECIFICATIONS

A. Should any bidder observe any ambiguity, discrepancy, omission, or error in the Drawings, Specifications, or other Contract Documents, or be in doubt as to the intention and meaning thereof, bidder should notify Engineer immediately for collaborative effort to correct any issues.

B. Neither the Owner nor the Engineer will be responsible in any matter for verbal answers regarding intent or meaning of the Contract Documents, or for verbal instructions by whomsoever made, prior to award of the Contract. Bidders for their own protection should submit all questions or clarifications in writing.

C. Any questions or clarifications shall be referred to the Engineer at least three (3) business days prior to bidding to allow for issuance of addendum. Beyond the three (3) day deadline, Bidder shall make his own decision and qualify all assumptions made clearly on bid proposal.

1.7 CHANGES AND ADDITIONAL WORK

A. No changes shall be made from the work as called for by these Specifications and Drawings, except on written order of the Engineer. No charge for extra work will be allowed unless such extra work has been duly authorized by a written order of the Engineer stating the change(s) to be made.

1.8 UTILITY CONNECTIONS

A. All fees for work under Division 23 shall be paid by this contractor.

B. It is the responsibility of the Contractor to re-confirm with the Utility Companies, prior to bidding, that locations, arrangements, line sizes, pressures, interruptions, shut downs, etc., are in accordance with their regulations and requirements.

C. Contractor to coordinate all voltages with electrical prior to ordering equipment.

1.9 SUBMITTALS

A. Submit under provisions of Division 1.

B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

C. **Electronic submittals will be acceptable however the Contractor shall submit to Engineer a minimum of one (1) bound hard copy for review. Electronic submittals will not be reviewed until hard copy has been received.**

D. Review of Submittals does not relieve the Contractor of any of the requirements of the Contract Documents. Failure by the Engineer to document errors and omissions in the Contractor's submittals during the Engineer's submittal review does not constitute a waiver of any of the requirements of the original Contract Documents.

E. Items installed on project without prior approval are subject to rejection and be replaced at Contractors expense.

F. Submittal required shall include:
1. ¼" scale of piping and equipment.
2. Electrical characteristics of all equipment.
3. All HVAC equipment and accessories.
4. Piping material and insulation.
5. Controls.
6. Test and Balance Contractor certifications.
7. Piping hangers and supports.
8. Other items as listed in their respective specification section.

1.10 SUBMITTALS AT PROJECT CLOSEOUT

A. Submit under provisions of Division 1.

B. Provide record "As Built" prints at the completion of the job. Keep a set of prints on the job and record day to day changes to Contract Documents with red pencil. Indicate actual location of piping, ductwork, valves, dampers, equipment, cleanouts, etc.

C. Prior to reviewing or responding to the request for final payment, the Engineer shall receive from the Contractor one (1) complete set of As-Built prints, marked as indicated in paragraph "B" above, indicating the actual completed installation of the work included under this contract.

D. Operation and Maintenance: Three (3) copies of equipment O&M manuals contained in rigid 3-ring binders shall be submitted to the Owner a minimum of fifteen (15) days prior to equipment/systems training. Binders shall have permanent labels on the spine and front cover indicating project name, contents, and completion date. Model and serial numbers of equipment shall be shown on the cover of their respective O&M manual(s).

1.11 REGULATORY REQUIREMENTS

A. Conform to all codes in effect by authority having jurisdiction.

B. Conform to National Fire Protection Association documents in effect in by the local authority.

C. Contractor is responsible for compliance with OSHA and ADA Regulations.

D. If no local building codes are in effect, Contractor shall comply with the 2015 International Building, Mechanical, Plumbing, and Gas Codes.

E. Obtain permits and request inspections from authority having jurisdiction.

1.12 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Examine not only the plans and specifications for this Division but plans and specifications of other Divisions of work and visit the site to become acquainted with existing conditions. Execution of Contract is evidence that Contractor has examined all drawings and specifications, and that all conditions which have a bearing in any way on the manner of installing the work in this Division are known. Later claims for labor and materials required due to difficulties encountered, which could have been eliminated had examination been made, will not be accepted.

C. Prepare 1/4" scale coordination drawings showing proposed rearrangement of Work to meet Project conditions utilizing actual products submitted for each mechanical space, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.

D. Measurement of Drawings by scale shall not be used as dimensions for fabrication. Measurements for locating fixtures, equipment, ductwork, piping and other mechanical items shall be made on the site and shall be based on actual job conditions.

1.13 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.

1.14 WARRANTIES

A. Furnish the Owner/Engineer with all extended guarantees and warranties for all equipment.

B. Prepare warranty documents for each mechanical equipment item with warranty date, validation, model and serial numbers, and similar required warranty information. Include mailing address for each warranty document.

C. In addition to the customary manufacturer’s guarantee on materials, this Contractor shall guarantee all materials and equipment furnished by him and all workmanship incidental to the HVAC Systems contract for a period of one (1) year following the date of final inspection and approval. Any defective material or workmanship which becomes apparent during the one year period shall be replaced by him without additional cost to the Owner.

D. All warranties and guarantees to be covered by Original Equipment Manufacturer (OEM) unless otherwise prior approved.

1.15 SUBSTITUTIONS AND PRODUCT OPTIONS

A. If any bidder desires to submit products of manufacturers not listed, he may submit a request for prior approval to the Engineer no later than **10 days** prior to the bid date. If the Engineer decides to accept the manufacturer submitted, they will be listed as “Approved” by written addendum. If the manufacturers are not listed as approved by either addendum or in the specifications, they will not be accepted.

B. Contractor shall base his bid on items of equipment actually named in these specifications and any addendums issued prior to bidding.

C. Refer also to Division 1.

1.15 SUBMISSION OF SUBSTITUTIONS

A. If substitution of equipment and materials are being made that differ from the Basis of Design listed on the Contract Drawings, the following information shall be provided:
   1. Complete product data clearly indicating substituted product meet and/or exceeds the specifications of the Basis of Design products.
   2. Complete manufacturer's literature.
   3. Identify any and all variations between substituted product and Basis of Design.
   4. Identify any impacts substituted product will have on other Contracts. (ie. Electrical, plumbing, sprinkler, structural, site modifications, etc.).

B. Once the submission has been received, the Engineer will review and return the submittal. Submittal will be marked approved or rejected.

1.16 CONTRACTOR'S SUBSTITUTION RESPONSIBILITIES

A. If Contractor has submitted substituted product(s); he or she contends:
   1. The substituted product(s) meets and/or exceeds the specifications of the Basis of Design product(s).
   2. The substituted product(s) meet and/or exceeds the warranty requirements of the Basis of Design product(s).
   3. Any necessary changes in work or work scope regarding substituted product(s) will be completed.
   4. That no additional cost will be incurred to other parties as a result of the substituted product(s).

PART 2 — PRODUCTS

2.1 QUALITY

A. All products shall be new and unused and remain in that condition through construction.

B. All products shall be in current production. Discontinued products shall not be used.

2.2 MATERIALS

A. All equipment shall be installed in strict accordance with the manufacturer’s recommendations. Any conflicts between these and the Drawings and Specifications shall be promptly reported to the Engineer for a decision before proceeding. All auxiliary piping, valves, accessories, electrical connections, and similar items recommended by the manufacturer, or required for proper and safe operation, shall be furnished and installed complete whether or not such auxiliaries are specifically noted or shown.

PART 3 — EXECUTION

3.1 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturers' instructions, with seals and labels intact and legible.

B. All items shall be protected from the elements. If stored outside, provide blocking to raise the base of each item well above ground and water levels.

C. Provide additional protection for items subject to damage, where necessary, so that when installed the items will be in new condition.

D. All items received by the Contractor shall be left in their original containers, or as shipped where possible, until installed in final locations.

E. Deliver piping with factory end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dust, dirt, debris, and moisture. Elevate pipes above grade.

F. Any equipment damaged during installation shall be repaired with materials and procedures to match original factory finish.

3.2 WORKMANSHIP

A. Work under this Division shall be first class with emphasis on neatness and workmanship.

3.3 JOBSITE OBSERVATIONS BY ENGINEER

A. Contractor shall notify the Engineer at least forty-eight (48) hours in advance such that Engineer can visit the job for review at the following stages:
   1. As equipment is being set in final location.
   2. As piping is being run.
   3. Before concealing ductwork and/or piping with ceilings, walls or slab.

B. If frequent violations are reported, follow-up inspections will be made to insure compliance with the Contract Documents. All costs incurred for time and travel will be billed to the General Contractor.

C. Should the Contractor fail to notify the Engineer of requested times of observation, it shall be his responsibility and any costs associated with to make ductwork or piping accessible (remove ceilings and/or insulation) or exposing any concealed ductwork or piping.

3.4 ACCESSIBILITY

A. All equipment shall be installed in such a way that all components requiring access (valves, drain pans, fire dampers, control dampers, filters, belts, etc.) are located and installed so they can be serviced, reset, calibrated, etc., by service technicians with normal service equipment and tools. If any equipment or components are shown in such a way that this Contractor cannot comply with the above, the Contractor shall notify the General Contractor and attempt to resolve the problem of access. The Engineer shall be notified in writing and a collaborative effort between design team and Contractor(s) will be made to resolve the conflict.

3.5 STARTING OF SYSTEMS

A. Do not use equipment for temporary conditioning of the building, unless approved in advance by the Owner or Authorized Owner's Representative. Should this be the case, install new air filters prior to turning the building over to the Owner. Contractor will be responsible for payment of utilities used for temporary heating.

B. If during final inspection by the Engineer, any mechanical equipment item is not operational, the Contractor is responsible for rescheduling the re-inspection trip and is subject to additional expenses.

C. Contractor shall provide training/demonstration on all HVAC and/or equipment. Schedule with Owner.

3.6 FINAL CLEANING

A. Thoroughly clean all equipment free from construction dust and debris. All outdoor equipment to be cleaned free of any dirt, mud, concrete splashes or debris. Repair or replace any damaged parts or panels.

B. All damaged surfaces shall be touched up to match O.E.M. paint. This includes but not limited to A/C equipment tops, access panels and ceiling diffusers.

END OF SECTION 230500

SECTION 230505 – BASIC MECHANICAL MATERIALS AND METHODS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Basic Mechanical Materials and Methods indicated on Drawings and specified herein.

1.3 SUMMARY

A. This section includes the following basic mechanical materials and methods to compliment other Division 22 & 23 Sections:
   1. Piping and installation instructions common to most piping systems.
   2. Concrete equipment base construction requirements.
   3. Nonshrink grout for equipment supports.
   4. Field-fabricated metal equipment supports.
   5. Installation requirements common to equipment specification Sections.
   6. Cutting and patching.
   7. Touchup painting and finishing.
   8. Piping specialties.

B. Pipe and pipe fitting materials are specified in piping system Sections.

1.4 DEFINITIONS

A. Pipe and pipe fittings, and piping include tube, tube fittings, and tubing.

B. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below the roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.

C. Exposed Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

D. Exposed Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

E. Concealed Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

F. Concealed Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.5 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract.

B. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

C. Coordination drawings for access panel and door locations.

D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.6 QUALITY ASSURANCE

A. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code—Steel."

B. Qualify welding process and operators for piping according to ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications."
   1. Comply with provisions for ASME B31 series "Code for Pressure Piping."
   2. Certify that each welder has passed AWS Qualification tests for the welding processes involved and that certification is current.

C. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

D. Equipment Section: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

E. Coordinate all electrical service requirements for mechanical equipment prior to the submittal of shop drawings. Confirm the compatibility of all power services with the equipment being furnished. Confirm the compatibility of electrical lugs being provided by the equipment manufacturer with power wiring being furnished under Division 26. Furnish written documentation that all characteristics have been coordinated with and confirmed by the electrical subcontractor.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. When stored inside, do not exceed structural capacity of the floor.

C. Protect flanges, fittings, and piping specialties from moisture and dirt.

D. Protect stored plastic pipes from direct sunlight. Support to prevent sagging and bending.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate mechanical and plumbing equipment installation with other building components.

B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for mechanical and plumbing installations.

C. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

D. Sequence, coordinate, and integrate installations of mechanical/plumbing materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning prior to closing in the building.

E. Coordinate connections of electrical services.

F. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.

G. Coordinate requirements for access panels and doors where mechanical and plumbing items requiring access are concealed behind finished surfaces.

H. Coordinate installation of identifying devices after completing covering and painting where devices are applied to surfaces. Install identifying devices prior to installing acoustical ceilings and similar concealment.

PART 2 — PRODUCTS

2.1 PIPE AND PIPE FITTINGS

A. Refer to individual piping system specification Sections for pipe and fitting materials and joining methods.

B. Pipe threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual piping system specification Sections in Division 23 for special joining materials not listed below.

B. Pipe Flange Gasket Materials: Suitable for the chemical and thermal conditions of the piping system contents.
   1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch minimum thickness, except where thickness or specific material is indicated.
      a) Full-Face Type: For flat-face, Class 125 cast-iron and cast-bronze flanges.
      b) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
   2. ASME B16.20 for grooved, ring-joint, steel flanges.
   3. AWWA C110, rubber, flat face, 1/8 inch thick, except where other thickness is indicated; and full-faced or ring type, except where type is indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, except where other material is indicated.

D. Solder Filler Metal: ASTM B32.
   1. Alloy Sn95 or Alloy Sn94: Tin (approximately 95%) and silver (approximately 5%), having 0.10 % lead content.

E. Brazing Filler Metals: AWS A5.8.
   1. BCuP Series: Copper-phosphorous alloys.
   2. BAg1: Silver alloy.

F. Welding Filler Materials: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements: Manufacturer's standard solvents complying with the following:
   1. Poly (Vinyl Chloride) PVC: ASTM D 2564.

2.3 PIPING SPECIALTIES

A. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type where required to conceal protruding fittings and sleeves.
   1. Inside Diameter: Closely fit around pipe and tube, and insulation.
   2. Outside Diameter: Completely cover opening.
   3. Cast Brass: One-piece, with set-screw.
      a) Finish: Polished chrome plate.

B. Dielectric Fittings: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
   1. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld neck end types and matching piping system materials.
   2. Insulating Material: Suitable for system fluid, pressure, and temperature.
   3. Dielectric Unions: Factory-fabricated, union assembly for 250-psig minimum working pressure at a 180° F temperature.
   4. Dielectric Flanges: Factory-fabricated, companion flange assembly for 150- or 300-psig minimum pressure to suit system pressures.
   5. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
      a) Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum pressure to suit system pressures.

C. Mechanical Sleeve Seals: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
   1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   2. Pressure Plates: Carbon steel. Include two for each sealing element.
   3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

D. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
   1. Steel Sheet-Metal: 24-gage or heavier galvanized sheet metal, round tube closed with welded longitudinal joint.
   2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
   3. Cast Iron: Cast Fabricated “wall pipe” equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.4 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
   1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
   2. Design Mix: 5000-psi, 28-day comprehensive strength.
   3. Packaging: Premixed and factory-packaged.

PART 3 — EXECUTION

3.1 PIPING SYSTEMS – COMMON REQUIREMENTS

A. General: Install piping as described below, except where system Sections specify otherwise. Individual piping system specification sections in Division 21, 22, & 23 specify piping installation requirements unique to the piping system.

B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, except where deviations to layout are approved on coordination drawings.

C. Install piping at indicated slope.

D. Install components having pressure rating equal to or greater than system operating pressure.

E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.

F. Install piping free of sags and bends.

G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, except where indicated.

H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling and panel removal.

I. Install piping to allow application of insulation plus 1-inch clearance around insulation.

J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

K. Install fittings for changes in direction and branch connections.

L. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, suspended ceilings, cabinet interiors and other exposed locations, according to the following:
   1. Chrome-Plated Piping: Cast-brass, one-piece, with set-screw, and polished chrome-plated finish. Use split-casting escutcheons, where required, for existing piping.
   2. Uninsulated Piping Wall Escutcheons: Cast-brass or stamped-steel, with set-screw.
   3. Uninsulated Piping Floor Plates in utility Areas: Cast iron floor plates.
   4. Insulated Piping: Cast-brass or stamped steel, with concealed hinge, spring clips, and chrome plated finish.
   5. Piping in Utility Areas: Cast-brass or stamped-steel, with set-screw or spring clips.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipe passing through concrete and masonry walls, concrete floor and roof slabs, exterior walls and where indicated.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a) Exception: extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring where specified.
   2. Build sleeves into new walls and slabs as work progresses.
   3. Install large enough sleeves to provide ¼-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials.
      a) Steel Pipe Sleeves: For pipes smaller than 6 inches.
      b) Steel Sheet-metal Sleeves: For pipes 6 inches and larger that penetrate gypsum-board partitions.
   4. Except for below-grade wall penetrations, seal annular space between sleeve and pipe or pipe insulation in non-rated floors and partitions, using elastomeric joints sealants. EXCEPTION: Fire rated partition penetrations shall be sealed with U.L. Listed firestopping systems.

O. Above Grade, Exterior Wall, Pipe Penetrations: Seal penetrations using sleeves and elastomeric sealant. Size sleeve for ½-inch annular clear space between pipe and sleeve for installation of sealant.
   1. Install steel pipe for sleeves smaller than 6 inches.
   2. Install sheet metal sleeve assembly for sleeves 6 inches or larger.
   3. Install material sleeves according to manufacturer's preprinted instructions.

P. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with U.L. Listed firestopping sealant system.

Q. Verify final locations for roughing-in.

R. Refer to equipment specifications in other sections for roughing-in requirements.

S. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

T. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system Sections.
   1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
   2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
   3. Soldered Joints: Construct joints according to AWS "Soldering Manual," Chapter 22 "The Soldering of Pipe and Tube."
   4. Brazed Joints: Construct joints according to AWS "Brazing Manual" in the "Pipe and Tube" chapter.
   5. Threaded Joints: Thread pipe with tapered threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:
      a) Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
      b) Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
      c) Align threads at point of assembly.
      d) Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
      e) Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
   6. Welded Joints: Construct joints according to AWS D10.12 "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe" using qualified processes and welding operators.
   7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricant on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
   8. Plastic Pipe and Fitting Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following standards:
      a) Comply with ASTM F 402 for safe handling of solvent-cement and primers.
      b) Poly (Vinyl Chloride) (PVC) Non-Pressure Application: ASTM D 2855.

U. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
   1. Install unions in piping 2 inches and smaller adjacent to each valve and at final connection to each piece of equipment having a 2-inch or smaller threaded pipe connection.
   2. Install flanges in piping 2-1/2 inches and larger adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
   3. Install dielectric unions and flanges to connect piping materials of dissimilar metals.
   4. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
   5. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

A. Install equipment to provide the maximum possible headroom where mounting heights are not indicated.

B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to the Architect.

C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.

D. Install mechanical and plumbing equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

E. Install equipment giving right-of-way to piping systems installed at a required slope.

3.3 PAINTING AND FINISHING

A. Damage and Touch Up: Repair marred and damaged factory painted-finishes with materials and procedures to match original factory finish.

B. Paint all exposed steel surfaces of piping and supports with one coat of primer and two coats of enamel.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger than supported unit in both directions. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi, 28-day compressive strength concrete with reinforcing fiber; 1.5#/cu. yd. Outdoor concrete bases shall extend a minimum of 4" above grade and be a minimum thickness of 6".

B. See also details on drawings.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.

B. Field Welding: Comply with AWS D1.1 "Structural Welding Code–Steel."

3.6 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of the trades involved.

B. Repair cut surfaces to match adjacent surfaces.

3.7 GROUTING

A. Install nonmetallic nonshrink grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's printed instructions.

B. Clean surfaces that will come into contact with grout.

C. Provide forms for placement of grout, as required.

D. Avoid air entrapment when placing grout.

E. Place grout to completely fill equipment bases.

F. Place grout on concrete bases to provide a smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout according to manufacturer's printed instructions.

3.8 ELECTRICAL COORDINATION/CONNECTIONS – COMMON REQUIREMENTS

A. Comply with applicable requirements in Division 26 Sections, and NFPA 70.

B. Provide integral wiring of controls and alarm wiring related to this Division as follows:
   1. Include internal wiring required for the operation of mechanical systems and equipment.
   2. Wiring related to HVAC controls.

C. Provide exact location for rough-in to Division 26, along with electrical load, size and electrical characteristics for all services required.

3.9 OPERATION OF MECHANICAL EQUIPMENT DURING CONSTRUCTION

A. Equipment shall not be started until the startup procedures indicated in their related sections have been completed. The contractor shall verify that the temporary conditions under which the equipment is to operate will not cause damage to the equipment.

B. Operation of the equipment shall be in accordance with the manufacturers written instructions. Temporary operating connections, controls, bypasses or other conditions shall not void warranty, and shall follow safe operating practices.

C. Equipment shall not be operated above its scheduled capacities.

D. Pumps shall not be operated until hydronic systems have been tested, flushed and properly treated.

E. Exhaust fans shall not be operated during construction operations producing large amounts of air borne dirt and debris unless the intakes are covered with temporary filter material.

END OF SECTION 230505

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Hangers and Supports for HVAC Piping and Equipment indicated on Drawings and specified herein.

1.3 SUMMARY

A. This Section includes the following hangers and supports for plumbing system piping and equipment:
   1. Steel pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Metal framing systems.
   4. Thermal-hanger shield inserts.
   5. Fastener systems.

1.4 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.5 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

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

1.6 SUBMITTALS

A. Product Data for the following:
   1. Steel pipe hangers and supports.
   2. Thermal-hanger shield inserts.
   3. Powder-actuated fastener systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
   1. Trapeze pipe hangers. Include Product Data for components.
   2. Metal framing systems. Include Product Data for components.
   3. Thermal-hanger shield inserts. Include Product Data for components.

C. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.2, "Structural Welding Code--Aluminum."
3. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
4. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
   1. AAA Technology & Specialties Co., Inc.
   2. Bergen-Power Pipe Supports.
   3. B-Line Systems, Inc.; a division of Cooper Industries.
   4. Carpenter & Paterson, Inc.
   5. Empire Industries, Inc.
   6. ERICO/Michigan Hanger Co.
   7. Globe Pipe Hanger Products, Inc.
   8. Grinnell Corp.
   9. GS Metals Corp.
   10. National Pipe Hanger Corporation.
   11. PHD Manufacturing, Inc.
   12. PHS Industries, Inc.
   13. Piping Technology & Products, Inc.
   14. Tolco Inc.

B. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts. The total load of piping components imposed on trapeze spans shall not exceed manufacturer's design load rating. Load calculation and detail of each unit shall include a safety factor of two times the expected load.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
   1. B-Line Systems, Inc.; a division of Cooper Industries.
   2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
   3. GS Metals Corp.
   4. Power-Strut Div.; Tyco International, Ltd.
   5. Thomas & Betts Corporation.

6. Tolco Inc.
7. Unistrut Corp.; Tyco International, Ltd.

B. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:
1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.
5. Rilco Manufacturing Company, Inc.
6. Value Engineered Products, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Manufacturers:
   a) Hilti, Inc.
   b) ITW Ramset/Red Head.
   c) Masterset Fastening Systems, Inc.
   d) MKT Fastening, LLC.
   e) Powers Fasteners.

B. Mechanical-Expansion Anchors: Insert-wedge-type [zinc-coated] [stainless] steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Manufacturers:
   a) B-Line Systems, Inc.; a division of Cooper Industries.
   b) Empire Industries, Inc.
   c) Hilti, Inc.
   d) ITW Ramset/Red Head.
   e) MKT Fastening, LLC.
   f) Powers Fasteners.

2.7 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Nonstaining, noncorrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 — EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which supports and anchors are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 PREPARATION

A. Proceed with installation of hangers, supports and anchors only after required building structural work has been completed in areas where the work is to be installed. Correct inadequacies including (but not limited to) proper placement of inserts, anchors and other building structural attachments.

B. Prior to installation of hangers, supports, anchors and associated work, Installer shall meet at project site with Contractor, installer of each component of associated work, inspection and testing agency representatives (if any), installers of other work requiring coordination with work of this section for purpose of reviewing material selections and procedures to be followed in performing the work in compliance with requirements specified.

3.3 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Support of piping and equipment shall be by means of engineered products designed for each application. Comply with manufacturer's design load capacities. Makeshift, field-devised methods such as use of scrap materials, plumber's tape, tie wires and similar methods are not permitted.

C. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

D. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

E. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

F. Use padded hangers for piping that is subject to scratching.

G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16 requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.

4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

H. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

I. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

J. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a) Light (MSS Type 31): 750 lb.
    b) Medium (MSS Type 32): 1500 lb.
    c) Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

K. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.4 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-58 and MSS SP-69 for construction standards and applications. Install hangers, supports, clamps, and attachments as required by the following table to properly support piping from building structure.

Pipe Size (in)	Max. Hanger Spacing (ft) (Steel Pipe)	Max Hanger Spacing (ft) (CopperTube)	Min. Rod Size (in)
1/2	7	5	3/8
3/4	7	5	3/8
1	7	6	3/8
1-1/4	7	6	3/8
1-1/2	9	7	3/8
2	10	8	3/8
2-1/2	10	8	1/2
3	12	9	1/2
4	14	10	5/8
5	16	12	5/8
6	17	14	3/4
8	19	16	7/8

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
   1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
   2. For applications not suited to, or exceeding the capacity of manufactured supports, field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
   1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
   2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Each equipment support in first paragraph below requires calculation and detail.

H. Equipment Support Installation: Use manufactured equipment supports designed for and recommended by manufacturer for specific applications. Comply with manufacturer's rated load capacities. For applications not suited to, or exceeding the capacity of manufactured supports, fabricate supports from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

N. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a) Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      b) Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      c) Do not exceed pipe stress limits according to ASME B31.9 for building services piping.
   2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      a) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

b) High compressive-strength inserts may permit use of shorter shields or shields with less arc span.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a) NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b) NPS 4: 12 inches long and 0.06 inch thick.
   c) NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d) NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

O. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

P. Place hangers within 12 inches of each horizontal elbow.

Q. Use hangers with 1-1/2 inch minimum vertical adjustment.

3.5 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.6 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports, as required, unless noted otherwise.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.7 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1 inch.

3.8 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Identification For HVAC Piping and Equipment indicated on Drawings and specified herein.

1.3 SUMMARY

A. Section Includes:
   1. Equipment labels.
   2. Pipe labels.
   3. Valve tags.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

C. Valve numbering scheme.

D. Valve Schedules: For each piping system to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the requirements, provide products by one of the following:
   1. Seton Name Plate Co.
   2. Marking Services Inc.
   3. Emed.

2.2 EQUIPMENT LABELS

A. Plastic Labels for Equipment:
   1. Manufacturers:

a) Seton Name Plate Company Model JS0052.
b) Other acceptable manufacturers offering equivalent products.
i. Brady U.S.A., Inc.
ii. EMED Company, Inc.

2. Description: Laminated three layer plastic with engraved black letters on white background.
3. Fasteners: Stainless-steel rivets or self-tapping screws.
4. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

2.3 PIPE LABELS

A. Color: Conform to ANSI A13.1.

B. Indoor Piping Markers: Seton "Opti-Code" self adhesive pipe markers. Provide Seton "Arrows On-A-Roll Tape" to identify direction of flow.

C. Outdoor Piping Markers: Seton "Ultra-Mark" high performance pipe markers. Arrows included on markers to indicate direction of flow.

2.4 VALVE TAGS

A. Valve Tags: 1-1/2" diameter round with 3/16" top hole, stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link chain.
3. No painted tags will be accepted.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
1. Valve-tag schedule shall be included in operation and maintenance data.

C. Number sequences shall be from 1 thru 999 with top line legends as follow:
1. Chilled Water Supply CHWS
2. Chilled Water Return CHWR
3. Condenser Water Supply CWS
4. Condenser Water Return CWR
5. Hot Water Heating Supply HWS
6. Hot Water Heating Return HWR

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.
1. Motor Driven Equipment
2. Starters and Disconnect Switches

3. Control Devices

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Pipe Label Legends:
1. Heating and Air Conditioning
   a) Chilled Water Supply
   b) Chilled Water Return
   c) Condenser Water Supply
   d) Condenser Water Return
   e) Heating Water Supply
   f) Heating Water Return
   g) Make-up Water

3.4 VALVE-TAG INSTALLATION

A. All valves and regulators (except those directly serving equipment) shall be provided with a brass tag securely wired in place on the valve stem below the packing gland nut. Tags shall clearly indicate the part of system, or room name and/or number controlled by the valve.

B. Furnish Owner with electronic/digital copies of valve schedule, giving valve number controlled by the valve and location of valve.

C. Prepare separate directories and drawings for the plumbing, heating, and air conditioning systems showing system layout as installed, and giving the number, location, and purpose of each component. The Contractor shall contact the A/E before starting the directory to insure proper tagging and listing.

D. Where it is necessary to operate more than one valve to control a section of piping, this fact and the numbers of the secondary valves shall be noted on the directory.

E. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units. List tagged valves in a valve schedule.

F. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
   1. Valve-Tag Size and Shape: 1-1/2 inches (38 mm), round.
   2. Valve-Tag Color: White.
   3. Letter Color: Black.

END OF SECTION 230553

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Testing, Adjusting, and Balancing indicated on Drawings and specified herein.

1.3 REFERENCE STANDARDS

A. ASHRAE-Standard 111--1988 Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air Conditioning, and Refrigeration Systems.

B. ASHRAE —1991 HVAC Applications Handbook: Chapter 34--Testing, Adjusting and Balancing.

C. AABC--National Standards for Total System Balance.

D. NEBB--Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

E. SMACNA--HVAC Systems--Testing, Adjusting and Balancing.

F. Sheet Metal Industry--Testing, Adjusting, Balancing Bureau (TABB) Certified Technician Standards, Procedures and Specifications.

1.4 DESCRIPTION

A. Provide total mechanical systems testing, adjusting and balancing. Requirements include the balance of air and water distribution, equipment adjustments to provide design quantities indicated on the drawings, and electrical measurement and verification of performance of all equipment.

B. Test, adjust and balance all air and hydronic systems so that each room, piece of equipment or terminal device is using the quantities indicated on the drawings and in the specifications.

1.5 SUMMARY

A. This Section specifies the requirements and procedures for total mechanical systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

B. Test, adjust, and balance the following mechanical systems:
   1. Exhaust air systems
   2. Verify temperature control system operation.
   3. Hydronic systems.

1.6 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: Must have at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Agency Qualifications:
   1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.
   2. The independent testing, adjusting, and balancing agency must be certified by the National Environmental Balancing Bureau (NEBB) or by the Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project.

C. Codes and Standards
   1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."
   2. AABC: "National Standards for Total System Balance".
   3. American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE): ASHRAE Handbook, 1999 HVAC Applications Volume, Chapter 36, Testing, Adjusting, and Balancing.

1.7 SUBMITTALS

A. Agency Data:
   1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified.

B. Engineer and Technicians Data:
   1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified.

C. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

D. Sample Forms: Submit sample forms, if other than those standard forms prepared by the Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) are proposed.

E. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems.

F. Submission: Submit three (3) complete sets of reports. If information is incomplete or further testing, adjusting and balancing is deemed necessary, resubmit three (3) final complete sets.

G. Report Format and Contents:
   1. Format: Bind report forms in three-ring binders or portfolio binders. Label edge and binder front cover with label identifying project name, project number and descriptive title of contents. Divide the contents of the report into the below listed divisions, separated by divider tabs:
      a) General Information (title page and instrument list)
      b) Summary
      c) Air Systems
      d) Water Systems
      e) Special Systems
   2. Title Page:
      a) Company name
      b) Company address
      c) Company telephone number
      d) Name, signature, and registration number of each technician
      e) Project name
      f) Project location

g) Project Architect
h) Project Engineer
i) Project Contractor
j) Date of report
k) Balancing methodology (Ratio or Herman Method)

3. Instrument List:
   a) Instrument
   b) Manufacturer
   c) Model
   d) Serial number
   e) Range
   f) Calibration histories
4. Summary page(s) to include:
   a) Provide sheet describing mechanical system deficiencies.
   b) Describe objectionable noise or drafts found during testing, adjusting and balancing.
5. The remainder of the report shall contain the appropriate forms for each respective item and system. Fill out forms completely. Indicate on form when information cannot be obtained or is not applicable.
6. For air systems, the forms shall, at a minimum, include:
   a) Names and initials of personnel performing the balancing (on each form).
   b) Dates balancing were performed. (on each form)
   c) Weather conditions at the time of the test (especially temperature).
   d) All motor rated data: voltages, amps, RPM, HP, manufacturer, starter and overload protective device sizes.
   e) All motor operating data (before and after adjustments) voltages, amps, RPM, HP, BHP, and sheave size/rating and manufacturer.
   f) All fan data (design and operating): supply and return CFM, operating static pressures (suction, discharge, and fan static), fan sheave, belt size, fan RPM.
   g) All drive changes necessitated to obtain design capacities.
7. For water systems, the forms shall, at a minimum, include:
   a) Names and initials of personnel performing the balancing (on each form).
   b) Dates balancing were performed (on each form).
   c) All motor operating data (design and operating): voltages, amps, RPM, HP, BHP, starter and overload protective device sizes/rating.
   d) All pump data (design and operating): GPM, RPM, discharge pressure (no flow and full flow), suction pressure (no flow and full flow), total head pressure (no flow and full flow), impeller size, (ensure that pump curves are in O&M manuals).
   e) Flow levels for each unit served (design and operating).
   f) Heating and cooling coil water entering and leaving temperatures.
8. Any deficiencies that could not be resolved should be provided in writing and a possible explanation of the problem provided.

1.8 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning procedures.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

3.1 PRELIMINARY PROCEDURES FOR AIR SYSTEM BALANCING

A. Before operating the system, perform these steps:
   1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.

2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
5. Check filters for cleanliness.
6. Check dampers for correct and locked position, and temperature control for completeness of installation before starting fans.
7. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
8. Determine best locations in main and branch ductwork for most accurate duct traverses.
9. Place outlet dampers in the full open position.
10. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
11. Lubricate all motors and bearings.
12. Check fan belt tension.
13. Check fan rotation.
14. Report to Architect/Engineer any defects or deficiencies noted during performance of services.
15. Promptly report abnormal conditions in mechanical systems or conditions, which prevent system balance.
16. Beginning of work means acceptance of existing conditions.

3.2 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:
1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean and replace all strainers.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation.
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check operation of automatic bypass valves.
10. Check and set operating temperatures of chillers to design requirements.
11. Lubricate all motors and bearings.
12. Report to Architect/Engineer any defects or deficiencies noted during performance of services.
13. Promptly report abnormal conditions in mechanical systems or conditions, which prevent system balance.
14. Beginning of work means acceptance of existing conditions.

3.3 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

D. Apply instrument as recommended by the manufacturer.

E. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

F. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

G. Take all reading with the eye at the level of the indicated value to prevent parallax.

H. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

I. Take measurements in the system where best suited to the task.

3.4 PERFORMING TESTING, ADJUSTING, AND BALANCING ON AIR SYSTEMS

A. Perform testing, adjusting and balancing procedures on each system identified in drawing, in accordance with the detailed procedures outlined in the referenced standards except as may be modified below.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Provide fan and motor drive sheave adjustments necessary to obtain design performance.

D. Final air system measurements to be within the following range (unless directed otherwise by Engineer) of the specified CFM:

Fans	-5% to +10% of design value

E. Leave systems in proper working order by replacing belt guards, closing access doors and electrical boxes, and restoring temperature controls to normal operating settings.

F. Patch insulation, ductwork, and housings, using materials identical to those removed.

G. Seal ducts and piping, and test for and repair leaks.

H. Mark equipment settings, including damper control positions, valve indicators, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

I. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

3.5 PERFORMING TESTING, ADJUSTING AND BALANCING ON WATER SYSTEMS

A. Perform testing, adjusting and balancing procedures on each system identified in drawing, in accordance with the detailed procedures outlined in the referenced standards except as may be modified below.

B. Document valve type and its ability to fully regulate flow during various conditions (different flow, temperature, and control conditions).

C. Provide motor and impeller adjustments necessary to obtain design performance.

D. Measure and record pressure across pump during no flow and full flow conditions.

E. Final water system measurements to be within the following range (unless directed otherwise by Engineer) of the specified gpm:

Pumps	-10% to +10%
Coils, Boilers, Chillers	-10% to +10%

F. Measure and record design and actual pressure conditions prior and after coils, chillers, and filters.

G. Permanently mark equipment settings including valve positions, and control settings. Set and lock memory stops.

H. Leave systems in proper working order by closing access doors and electrical boxes and systems to normal operating settings.

3.6 RESPONSIBILITIES OF THE MECHANICAL CONTRACTOR

A. The mechanical contractor shall complete the installation and start all HVAC systems to ensure they are working properly, and shall perform all other items as described hereinafter to assist the balancing agency in performing the testing and balancing of the HVAC systems.

B. Air Distribution Systems:
1. Verify installation for conformity to design.
2. Ensure that all exhaust ducts are installed in such a manner that maximum allowable leakage rates as required by specifications are not exceeded.
3. Lubricating all motors and bearings.
4. Ensure that all fans (exhaust) are operating and free of vibration. All fans and drives shall be checked for proper fan rotation and belt tension. Overload protection shall be of proper size and rating. A record of motor current and voltage shall be made to verify that the motors do not exceed nameplate rating.
5. Make any necessary changes to the sheaves, belts, and dampers, as required by the balancing agency, at no additional cost to the Owner.

C. Water Circulating Systems:
1. Verify installation for conformity to design.
2. Check all pumps to verify pump alignment and rotation.
3. Ensure that systems are clean, with the proper strainer screens installed for normal operation.
4. Check all pump motors for current and voltage, to ensure that motors do not exceed nameplate rating.
5. Provide overload protection of proper size and rating.
6. Ensure that all water circulating systems shall be full and free of air; that expansion tanks are set for proper water level; and that all air vents were installed at high point of systems and are operating.
7. Check and set operating temperatures of heat exchangers to design requirements.

3.7 RESPONSIBILITIES OF THE TEMPERATURE CONTROL CONTRACTOR

A. The temperature-control contractor shall complete the installation of the temperature control system, and operate and test all controls systems to ensure they are functioning properly as designed. The temperature control contractor shall assist the balancing agency in testing and balancing the HVAC systems, as described hereinafter.
1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water reset, and fire and freeze stats.
2. Verify that all controlling instruments are calibrated and set for design operating conditions.
3. Calibrate room thermostats after installation, and before the thermostat control verification tests are performed. The balancing agency shall prove the accuracy of final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.
4. The temperature-control contractor shall allow sufficient time in the project to provide assistance and instruction to the balancing agency in the proper use and setting of control components such as but not limited to, computers, static pressure controllers, or any other device that may need set points changed so that the testing and balancing work can be performed.

3.8 RECORD AND REPORT DATA

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

END OF SECTION 230593

SECTION 230700 – HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all HVAC Insulation indicated on Drawings and specified herein.

1.3 SUMMARY

A. Section Includes:
   1. Insulation Materials:
      a) Cellular glass.
      b) Flexible elastomeric cellular.
      c) Fiberglass.
   2. Insulating cements.
   3. Adhesives.
   4. Mastics.
   5. Lagging adhesives.
   6. Sealants.
   7. Factory-applied jackets.
   8. Field-applied jackets.
   9. Tapes.
   10. Securements.
   11. Corner angles.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Shop Drawings: Show details for the following:
   1. Application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
   2. Insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
   3. Removable insulation at piping specialties, equipment connections, and access panels.
   4. Application of field-applied jackets.

1.5 QUALITY ASSURANCE

A. All piping requiring insulation shall be insulated as specified herein and as required for a complete system. In each case, the insulation shall be equivalent to that specified and materials applied and finished as described in these Specifications.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
   1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Application Company Qualifications: Company performing the Work of this Section must have minimum three (3) years experience specializing in the trade.

D. All insulation shall be applied by mechanics skilled in this particular Work and regularly engaged in such occupation.

E. All insulation shall be applied in strict accordance with these Specifications and with factory printed recommendations on items not herein mentioned. Unsightly, inadequate, or sloppy Work will not be acceptable.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

B. Deliver, store, protect, and handle products to the Project Site under provisions of Division 01 and Division 23.

C. Deliver materials to Site in original factory packaging, labeled with manufacturer's identification including product thermal ratings and thickness.

D. Store insulation in original wrapping and protect from weather and construction traffic. Protect insulation against dirt, water, chemical, and mechanical damage.

E. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

1.7 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MANUFACTURERS

A. Subject to compliance with requirements specified herewith, manufacturers offering products that may be incorporated in the Work include one of the following:
   1. Cellular Glass:
      a) Pittsburgh Corning Corporation; Foamglas Super K.
      b) Cell-U-Foam Corporation; Ultra-CUF.

2. Flexible Elastomeric Cellular:
   a) Aeroflex USA Inc.; Aerocel.
   b) Armacell LLC; AP Armaflex.
   c) RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
3. Fiberglass Preformed Pipe Insulation:
   a) Johns Manville; Micro-Lok.
   b) Knauf Insulation; 1000 Pipe Insulation.
   c) Owens Corning; Fiberglas Pipe Insulation.
4. Fiberglass Pipe and Tank Insulation:
   a) CertainTeed Corp.; CrimpWrap.
   b) Johns Manville; MicroFlex.
   c) Knauf Insulation; Pipe and Tank Insulation.
   d) Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass:
1. Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
7. Factory fabricated shapes according to ASTM C 450 and ASTM C 585.
8. 'K' Value: 0.38 at 75 degrees F.

G. Flexible Elastomeric Cellular:
1. Closed-cell, sponge- or expanded-rubber materials.
2. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
3. 'K' Value: 0.30 at 75 degrees F.

H. Fiberglass Preformed Pipe Insulation:
1. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL.
2. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
3. 'K' Value: 0.24 at 75 degrees F.
4. Minimum Service Temperature: -20 degrees F.
5. Maximum Service Temperature: 450 degrees F.

I. Fiberglass Pipe and Tank Insulation:
1. Mineral or glass fibers bonded with a thermosetting resin.
2. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB.

3. Nominal density is 2.5 lb/cu. ft. or more.
4. 'K' Value: 0.29 at 100 degrees F.
5. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 INSULATING CEMENTS

A. Fiberglass Insulating Cement: Comply with ASTM C 195.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Insulco, Division of MFS, Inc.; Triple I.
b) P. K. Insulation Mfg. Co., Inc.; Super-Stik.

B. Fiberglass, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Insulco, Division of MFS, Inc.; SmoothKote.
b) P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
c) Rock Wool Manufacturing Company; Delta One Shot.

2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Childers Products, Division of ITW; CP-96.
b) Foster Products Corporation, H. B. Fuller Company; 81-33.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Aeroflex USA Inc.; Aeroseal.
b) Armacell LCC; 520 Adhesive.
c) RBX Corporation; Rubatex Contact Adhesive.
2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Fiberglass Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Childers Products, Division of ITW; CP-82.
b) Foster Products Corporation, H. B. Fuller Company; 85-20.
c) ITW TACC, Division of Illinois Tool Works; S-90/80.
d) Marathon Industries, Inc.; 225.
e) Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements, provide one of the following:
a) Childers Products, Division of ITW; CP-82.
b) Foster Products Corporation, H. B. Fuller Company; 85-20.
c) ITW TACC, Division of Illinois Tool Works; S-90/80.
d) Marathon Industries, Inc.; 225.
e) Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
   1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-35.
      b) Foster Products Corporation, H. B. Fuller Company; 30-90.
      c) ITW TACC, Division of Illinois Tool Works; CB-50.
      d) Marathon Industries, Inc.; 590.
      e) Mon-Eco Industries, Inc.; 55-40.
      f) Vimasco Corporation; 749.
   2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 180 deg F.
   4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
   5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-10.
      b) Foster Products Corporation, H. B. Fuller Company; 35-00.
      c) ITW TACC, Division of Illinois Tool Works; CB-05/15.
      d) Marathon Industries, Inc.; 550.
      e) Mon-Eco Industries, Inc.; 55-50.
      f) Vimasco Corporation; WC-1/WC-5.
   2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
   3. Service Temperature Range: Minus 20 to plus 200 deg F.
   4. Solids Content: 63 percent by volume and 73 percent by weight.
   5. Color: White.

2.6 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
   1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-52.
      b) Foster Products Corporation, H. B. Fuller Company; 81-42.
      c) Marathon Industries, Inc.; 130.
      d) Mon-Eco Industries, Inc.; 11-30.
      e) Vimasco Corporation; 136.

B. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.

C. Service Temperature Range: Minus 50 to plus 180 deg F.

D. Color: White.

2.7 SEALANTS

A. Joint Sealants:
   1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-76.
      b) Foster Products Corporation, H. B. Fuller Company; 30-45.
      c) Marathon Industries, Inc.; 405.
      d) Mon-Eco Industries, Inc.; 44-05.
      e) Pittsburgh Corning Corporation; Pittseal 444.
      f) Vimasco Corporation; 750.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Permanently flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 100 to plus 300 deg F.
   5. Color: White or gray.
   6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. FSK and Metal Jacket Flashing Sealants:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-76-8.
      b) Foster Products Corporation, H. B. Fuller Company; 95-44.
      c) Marathon Industries, Inc.; 405.
      d) Mon-Eco Industries, Inc.; 44-05.
      e) Vimasco Corporation; 750.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F.
   5. Color: Aluminum.
   6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products, Division of ITW; CP-76.
   2. Materials shall be compatible with insulation materials, jackets, and substrates.
   3. Fire- and water-resistant, flexible, elastomeric sealant.
   4. Service Temperature Range: Minus 40 to plus 250 deg F.
   5. Color: White.
   6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.8 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
   1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
   2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

2.9 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:
   a) Childers Products, Division of ITW; Metal Jacketing Systems.
   b) PABCO Metals Corporation; Surefit.
   c) RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.
   a) Sheet and roll stock ready for shop or field sizing.
   b) Finish and thickness are indicated in field-applied jacket schedules.
   c) Moisture Barrier for Indoor Applications: 3-mil-thick, heatbonded polyethylene and kraft paper.
   d) Moisture Barrier for Outdoor Applications: 3-mil-thick, heatbonded polyethylene and kraft paper.
   e) Factory-Fabricated Fitting Covers:
      i. Same material, finish, and thickness as jacket.
      ii. Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
      iii. Tee covers.
      iv. Flange and union covers.
      v. End caps.
      vi. Beveled collars.
      vii. Valve covers.
      viii. Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

2.10 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
      b) Compac Corp.; 104 and 105.
      c) Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
      d) Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
   2. Width: 3 inches.
   3. Thickness: 11.5 mils.
   4. Adhesion: 90 ounces force/inch in width.
   5. Elongation: 2 percent.
   6. Tensile Strength: 40 lbf/inch in width.
   7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
      b) Compac Corp.; 110 and 111.
      c) Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
      d) Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
   2. Width: 3 inches.
   3. Thickness: 6.5 mils.
   4. Adhesion: 90 ounces force/inch in width.
   5. Elongation: 2 percent.
   6. Tensile Strength: 40 lbf/inch in width.
   7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.11 SECUREMENTS

A. Bands:
   1. Products: Subject to compliance with requirements, provide one of the following:
      a) Childers Products; Bands.
      b) PABCO Metals Corporation; Bands.

c) RPR Products, Inc.; Bands.

2. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with closed seal.

2.12 CORNER ANGLES

A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
   1. Verify that systems and equipment to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

3.3 COMMON INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:
   1. Draw jacket tight and smooth.
   2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
   3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
      a) For below ambient services, apply vapor-barrier mastic over staples.
   4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
   5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:
   1. Vibration-control devices.
   2. Testing agency labels and stamps.
   3. Nameplates and data plates.
   4. Manholes.
   5. Handholes.
   6. Cleanouts.

Q. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier damage and moisture saturated units.

R. Protection: Insulation Installer shall advise Contractor of required protection for insulation work during remainder of construction period, to avoid damage and deterioration. Remove insulation that has been damaged or gotten wet during shipping, storage or installation. Dry surfaces prior to installation of new insulation that replaces the damaged or wet insulation.

3.4 PENETRATIONS

A. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
   1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
   2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
   3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
   4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
   5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
   6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
   7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
   8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
   9. Label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
   1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
   2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
   3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
   4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between

flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:
   1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
   2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
   3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
   4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
   1. Install preformed pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
   4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
   2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
   1. Install preformed sections of cellular-glass insulation to valve body.
   2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   3. Install insulation to flanges as specified for flange insulation application.

3.7 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturers recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:
   1. Install pipe insulation to outer diameter of pipe flange.
   2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
   3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
   4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:
   1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

E. Insulation Installation on Equipment:
1. General: Install equipment thermal insulation products in accordance with manufacturer's written instructions, and in compliance with recognized industry practices to ensure that insulation serves intended purpose.
2. Install insulation materials with smooth and even surfaces and on clean and dry surfaces. Redo poorly fitted joints. Do not use mastic or joint sealer as filler for gapping joints and excessive voids resulting from poor workmanship.
3. Maintain integrity of vapor-barrier on equipment insulation and protect it to prevent puncture and other damage.
4. Install sheets of the largest manageable size.
5. Do not apply insulation to equipment, breechings, or stacks while hot.
6. Apply insulation using the staggered joint method for both single and double layer construction, where feasible.
7. Apply each layer of insulation separately.
8. Coat insulated surfaces with layer of insulating cement, troweled in workmanlike manner, leaving a smooth continuous surface. Fill in scored block, seams, chipped edges and depressions, and cover over wire netting and joints with cement of sufficient thickness to remove surface irregularities.
9. Cover insulated surfaces with all-service jacketing neatly fitted and firmly secured. Lap seams at least 2". Apply over vapor barrier where applicable.
10. Do not insulate boiler manholes, handholes, cleanouts, ASME stamp, and manufacturer's nameplate. Provide neatly beveled edge at interruptions of insulation.
11. Provide removable insulation sections to cover parts of equipment which must be opened periodically for maintenance; include metal vessel covers, fasteners, flanges, frames and accessories.
12. Equipment Exposed to Weather: Protect outdoor insulation from weather by installation of weather-barrier mastic protective finish, or jacketing, as recommended by the manufacturer.

3.8 FIBERGLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:
1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:
1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with fiberglass blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:
1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 FIELD-APPLIED JACKET INSTALLATION

A. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.10 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements. Remove defective Work.

C. Install new insulation and jackets to replace insulation and jackets removed for inspection.

3.11 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.

C. Chillers: The chiller shall be factory insulated. The insulation listed here is to be applied to un-insulated surfaces as indicated. Insulate cold surfaces on chillers, including, but not limited to, evaporator bundles, suction piping, compressor inlets, tube sheets, water boxes, heat recovery bundles, and nozzles with the following:
1. Flexible Elastomeric: 1 inch thick.

D. Chilled-water pump insulation shall be the following:
1. Flexible Elastomeric: 1 inch thick.

E. Chilled-water expansion/compression tank insulation shall be any of the following:
1. Flexible Elastomeric: 1 inch thick.
2. Fiberglass Pipe and Tank: 1 inch thick.

F. Chilled-water air-separator insulation shall be any of the following:
1. Cellular Glass: 2 inches thick.
2. Flexible Elastomeric: 1 inch thick.

G. Heating-hot water pump insulation shall be the following:
   1. Cellular Glass: 3 inches thick.
   2. Flexible Elastomeric: 1 inch thick.

H. Heating-hot water expansion/compression tank insulation shall be any of the following:
   1. Cellular Glass: 1-1/2 inches thick.
   2. Flexible Elastomeric: 1 inch thick.
   3. Fiberglass Pipe and Tank: 1 inch thick.

3.12 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Condensate and Equipment Drain Water below 60 Deg F:
   1. All Pipe Sizes: Insulation shall:
      a) Flexible Elastomeric: 3/4 inch thick.

B. Chilled Water Supply and Return:
   1. NPS 5 and Larger: Insulation shall be one of the following:
      a) Cellular Glass: 2 inches thick.

C. Heating - Hot Water Supply and Return:
   1. NPS 2 and Larger: Insulation shall be one of the following:
      a) Cellular Glass: 2 inches thick.
      b) Fiberglass Preformed Pipe Insulation: 2 inches thick.

D. Hot Water Service Drains and Vents:
   1. All Pipe Sizes: Insulation shall be one of the following:
      a) Cellular Glass: 1-1/2 inches thick.
      b) Fiberglass Preformed Pipe Insulation: 1 inch thick.

E. Make-Up Water:
   1. All Pipe Sizes: Insulation shall be the following:
      a) Fiberglass Preformed Pipe Insulation: 1 inch thick.

3.14 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Make-Up Water:
   1. All Pipe Sizes: Insulation shall be:
      a) Flexible Elastomeric: 2 inches thick.

3.15 INDOOR, FIELD APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
   1. Piping, Exposed:
      a) Aluminum, Smooth: 0.024 inch thick.
      b) Only jacket piping below 10’- 0” AFF.

3.16 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. Piping Exposed:
   1. Aluminum, Smooth: 0.024 inch thick.

END OF SECTION 230700

SECTION 230901 – VARIABLE FREQUENCY DRIVES

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions in the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, and services required for complete installation of all Variable Frequency Drives indicated on Drawings and specified herein.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Variable frequency drives will be provided by Owner. Contractor installed.

PART 3 — EXECUTION

3.1 INSTALLATION

A. Install variable frequency drive motor controls in accordance with manufacturer's instructions.

B. Make all connections between drive unit and motors.

C. Ground equipment.

D. Coordinate reference signal connections to controller with temperature control system (BAS).

E. Test variable frequency drive motor control system to design loading and verify performance as scheduled.

F. Instruct Owner's personnel on operation and maintenance of variable frequency drive motor control system.

END OF SECTION 230901

SECTION 230902 – ENCLOSED MOTOR CONTROLLERS (STARTERS)

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Enclosed Motor Controllers (Starters) indicated on Drawings and specified herein.

1.3 SUBMITTALS

A. Product Data: Provide catalog sheets showing voltage, controller size, ratings and size of switching and over current protective devices, short circuit ratings, dimensions, and enclosure details.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and indicated.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. General Electric.

B. Square D.

C. Cutler-Hammer.

2.2 MANUAL CONTROLLERS

A. Manual Motor Controller: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller with overload element, and accessory devices as required by drawings.

B. Fractional Horsepower Manual Controller: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, and accessory devices as required by drawings.

2.3 AUTOMATIC CONTROLLERS

A. Magnetic Motor Controllers: NEMA ICS 2, AC general-purpose Class A magnetic controller for induction motors rated in horsepower.

B. Provide auxiliary and pilot devices as required by drawings.

2.4 COMBINATION STARTERS

A. Combine motor controllers with protector non-fusible switch disconnect in common enclosure. Obtain IEC Class 2 coordinated component protection.

PART 3 — EXECUTION

3.1 INSTALLATION

A. Installation of enclosed controllers by Division 26, in accordance with manufacturer's instructions.

B. Select and install overload heater elements in motor controllers to match installed motor characteristics.

C. Provide engraved plastic nameplates under the provisions of Section 230553.

END OF SECTION 230902

SECTION 230923 - DIRECT DIGITAL CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Direct Digital Controls indicated on Drawings and specified herein.

1.3 RELATED SECTIONS

A. This Section includes the Building Management System (BMS) control equipment for HVAC systems and components, including open protocol control components for terminal heating and cooling units. Depending on the scope of the project, the complete specification may have numerous sections that interface to this section, including several from Division 25, 26, & 28.

1.4 QUALIFICATIONS OF BIDDER

A. All new systems must be an extension of the existing Schneider Electric EcoStruxure Building Automation System presently under Performance Contract agreement between the owner, UNA, and Schneider Electric.

B. The following bidders have been pre-qualified:
   1. Schneider Electric by Alabama Controls

1.5 SCOPE OF WORK

A. The Contractor shall connect all devices to the existing Schneider Electric EcoStruxure Building Automation System and shall furnish and install all components necessary for a complete building automation system including all necessary hardware and all operating and applications software necessary to perform the control sequences of operation as called for in this specification. Network level components of the system – workstations, servers, etc. shall communicate using the BACnet protocol, as defined by ASHRAE Standard 135-2004. No gateways shall be used for communication to controllers furnished under this section.
   At a minimum, provide controls for the following:
   1. Boilers including hot water pumps
   2. Chilled water system including pumps, chillers, and cooling towers
   3. Exhaust Fans
   4. Monitoring points for packaged equipment such as emergency generators
   5. Power wiring to DDC devices, smoke control dampers and BAS panels except as otherwise specified
   6. Refrigerant leak detection system
   7. Variable Frequency Drives

B. Except as otherwise noted, the control system shall consist of all necessary Ethernet Network Controllers, Standalone Digital Control Units, software, sensors, transducers, relays, valves, dampers, damper operators, control panels, and other accessory equipment, along with a complete system of electrical interlocking wiring to fill the intent of the specification and provide for a complete and operable system. Except as otherwise specified, provide operators for equipment such as dampers if the equipment manufacturer does not provide these. Coordinate requirements with the various Contractors.

C. The BAS contractor shall review and study all HVAC drawings and the entire specification to familiarize themselves with the equipment and system operation and to verify the quantities and types of dampers, operators, alarms, etc. to be provided.

D. All interlocking wiring, wiring and installation of control devices associated with the equipment listed below shall be provided under this Contract. When the BAS system is fully installed and operational, the BAS Contractor and representatives of the Owner will review and check out the system – see System Acceptance and Testing section of this document. At that time, the BAS contractor shall demonstrate the operation of the system and prove that it complies with the intent of the drawings and specifications.

E. Provide services and manpower necessary for commissioning of the system in coordination with the HVAC Contractor, Balancing Contractor and Owner's representative.

F. All work performed under this section of the specifications will comply with all governing codes, laws and governing bodies. If the drawings and/or specifications are in conflict with governing codes, the Contractor, with guidance from the engineer, shall submit a proposal with appropriate modifications to the project to meet code restrictions. If this specification and associated drawings exceed governing code requirements, the specification will govern. The Contractor shall obtain and pay for all necessary construction permits and licenses.

1.6 SYSTEM DESCRIPTION

A. In accordance to the scope of work, the system shall also provide a graphical, web-based, operator interface that allows for instant access to any system through a standard browser.
For this project, the system shall consist of the following components:
1. Ethernet-based Network Router and/or Network Server Controller(s): The BAS Contractor shall furnish needed quantity of Ethernet-based Network Server Controllers as described in Part 2 of the specification. These controllers will connect directly to the Operator Workstation over Ethernet at a minimum of 100mbps, and provide communication to the Standalone Digital Control Units and/or other Input/Output Modules. Network Server Controllers shall conform to BACnet device profile B-BC. Network controllers that utilize RS232 serial communications or ARCNET to communicate with the workstations will not be accepted. Network Controllers shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Building Controllers (B-BC).
2. Standalone Digital Control Units (SDCUs): Provide the necessary quantity and types of SDCUs to meet the requirements of the project for mechanical equipment control including air handlers, central plant control, and terminal unit control. Each SDCU will operate completely standalone, containing all of the I/O and programs to control its associated equipment. Each BACnet protocol SDCU shall conform to the BACnet device profile B-AAC. BACnet SDCUs shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Advanced Application Controllers (B-AAC).

B. The Local Area Network (LAN) shall be either a 10 or 100 Mpbs Ethernet network supporting BACnet, Modbus, XML and HTTP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Server Controllers (NSCs), user workstations and a local host computer system.

C. The Enterprise Ethernet (IEEE 802.3) LAN shall utilize Carrier Sense Multiple/Access/Collision Detect (CSMA/CD), Address Resolution Protocol (ARP) and User Datagram Protocol (UDP) operating at 10 or 100 Mbps.

D. The system shall enable an open architecture that utilizes EIA standard 709.1, the LonTalk™ protocol and/or ANSI / ASHRAE™ Standard 135-2004, BACnet functionality to assure interoperability between all system components. Native support for the LonTalk™ protocol and the ANSI / ASHRAE™ Standard 135-2004, BACnet protocol are required to assure that the project is fully supported by the HVAC open protocols to reduce future building maintenance, upgrade, and expansion costs.

E. The system shall enable an architecture that utilizes a MS/TP selectable 9.6-76.8 KBaud protocol, as a common communication protocol between controllers and integral ANSI / ASHRAE™ Standard 135-2004, BACnet functionality to assure interoperability between all system components. The AAC shall be capable of

communicating as a MS/TP device or as a BACnet IP device communicating at 10/100 Mbps on a TCP/IP trunk. The ANSI / ASHRAE™ Standard 135-2004, BACnet protocol is required to assure that the project is fully supported by the leading HVAC open protocol to reduce future building maintenance, upgrade, and expansion costs.

F. LonTalk™ packets may be encapsulated into TCP/IP messages to take advantage of existing infrastructure or to increase network bandwidth where necessary or desired.
   1. Any such encapsulation of the LonTalk™ protocol into IP datagrams shall conform to existing LonMark™ guide functionality lines for such encapsulation and shall be based on industry standard protocols.
   2. The products used in constructing the BMS shall be LonMark™ compliant.
   3. In those instances in which Lon-Mark™ devices are not available, the BMS contractor shall provide device resource files and external interface definitions for LonMark devices.

G. The software tools required for network management of the LonTalk™ protocol and the ANSI / ASHRAE™ Standard 135-2004, BACnet protocol must be provided with the system. Drawings are diagrammatic only. Equipment and labor not specifically referred to herein or on the plans and are required to meet the functional intent, shall be provided without additional cost to the Owner. BACnet clients shall comply with the BACnet Operator Workstation (B-OWS) device profile; with the ability to support data read and write functionality. Physical connection of BACnet devices shall be via Ethernet IP or MS/TP. Physical connection of LonWorks devices shall be via Ethernet IP or FTT-10A.

H. The system shall provide support for Modbus TCP and RTU protocols natively, and not require the use of gateways.

I. Complete temperature control system to be DDC with electronic sensors and electronic/electric actuation of Mechanical Equipment Room (MER) valves and dampers and electronic actuation of terminal equipment valves and actuators as specified herein. The BMS is intended to seamlessly connect devices throughout the building regardless of subsystem type, i.e. variable frequency drives, low voltage lighting systems, electrical circuit breakers, power metering and card access should easily coexist on the same network channel.
   1. The supplied system must incorporate the ability to access all data using HTML5 enabled browsers without requiring proprietary operator interface and configuration programs. The system shall not require JAVA to be enabled in the browser.
   2. Data shall reside on a supplier-installed server for all database access.
   3. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network.

J. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the approved manufacturer's local field office. The approved manufacturer's local field office shall have a minimum of 3 years of installation experience with the manufacturer and shall provide documentation in the bid and submittal package verifying longevity of the installing company's relationship with the manufacturer when requested. Supervision, hardware and software engineering, calibration and checkout of the system shall be by the employees of the approved manufacturer's local field office and shall not be subcontracted. The control contractor shall have an in place support facility within 100 miles of the site with factory certified technicians and engineers, spare parts inventory and all necessary test and diagnostic equipment for the installed system, and the control contractor shall have 24 hours/day, 7 days/week emergency service available.

K. Provide the Commissioning, configuration and diagnostic tool (CCDT), color display personnel computer, software, and interfaces to provide uploading/downloading of High Point Count Controllers (AAC), Unitary Equipment Controllers (UEC) and VAV controllers (VAVDDC), monitoring all BACnet objects, monitoring overrides of all controller physical input/output points, and editing of controller resident time schedules.

1.7 WORK BY OTHERS

A. The BAS Contractor shall cooperate with other contractors performing work on this project necessary to achieve a complete and neat installation. To that end, each contractor shall consult the drawings and specifications for all trades to determine the nature and extent of others' work.

B. The BAS Contractor shall furnish all Control Valves, Flow Meters, Sensor Wells and other similar equipment for installation by the Mechanical Contractor and/or others.

C. The BAS Contractor shall provide field supervision to the designated contractor for the installation of the following:
   1. Automatic control dampers
   2. The Electrical Contractor shall provide:
      a) All 120VAC power wiring to motors, heat trace, junction boxes for power to BAS panels.

1.8 CODE COMPLIANCE

A. Provide BAS components and ancillary equipment, which are UL-916 listed and labeled.

B. All equipment or piping used in conditioned air streams, spaces or return air plenums shall comply with NFPA 90A Flame/Smoke/Fuel contribution rating of 25/50/0 and all applicable building codes or requirements.

C. All wiring shall conform to the National Electrical Code.

D. Comply with FCC rules, Part 15 regarding Class A radiation for computing devices and low power communication equipment operating in commercial environments.

E. Comply with FCC, Part 68 rules for telephone modems and data sets.

1.9 SUBMITTALS

A. All shop drawings shall be prepared in Visio Professional or AutoCAD software. In addition to the drawings, the Contractor shall furnish a CD containing the identical information. Drawings shall be B size or larger.

B. Shop drawings shall include a riser diagram depicting locations of all controllers and workstations, with associated network wiring. Also included shall be individual schematics of each mechanical system showing all connected points with reference to their associated controller. Typicals will be allowed where appropriate.

C. Submittal data shall contain manufacturer's data on all hardware and software products required by the specification. Valve, damper and air flow station schedules shall indicate size, configuration, capacity and location of all equipment.

D. Software submittals shall contain narrative descriptions of sequences of operation, program listings, point lists, and a complete description of the graphics, reports, alarms and configuration to be furnished with the workstation software. Information shall be bound or in a three ring binder with an index and tabs. Diagrams shall be on 11″ by 17″ foldouts. If color has been used to differentiate information, the printed copies shall be in color.

E. Submit five (5) copies of submittal data and shop drawings to the Engineer for review prior to ordering or fabrication of the equipment. The Contractor, prior to submitting, shall check all documents for accuracy.

F. The Engineer will make corrections, if required, and return to the Contractor. The Contractor will then resubmit with the corrected or additional data. This procedure shall be repeated until all corrections are made to the satisfaction of the Engineer and the submittals are fully approved.

G. The following is a list of post construction submittals that shall be updated to reflect any changes during construction and re-submitted as “As-Built”.
   1. System architecture drawing.
   2. Layout drawing for each control panel
   3. Wiring diagram for individual components
   4. System flow diagram for each controlled system
   5. Instrumentation list for each controlled system

6. Sequence of control
7. Binding map
8. A matrix sheet detailing all system addresses and communication settings for the following:
   a) All IP network addresses & settings
   b) All BMS device addresses & communication settings
9. Operation and Maintenance Manuals

H. Information common to the entire system shall be provided. This shall include but not be limited to the following.
1. Product manuals for the key software tasks.
2. Operating the system.
3. Administrating the system.
4. Engineering the operator workstation.
5. Application programming.
6. Engineering the network.
7. Setting up the web server.
8. Report creation.
9. Graphics creation.
10. All other engineering tasks.
11. System Architecture Diagram.
12. List of recommended maintenance tasks associated with the system servers, operator workstations, data servers, web servers and web clients.
13. Define the task.
14. Recommend a frequency for the task.
15. Reference the product manual that includes instructions on executing the task.
16. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
17. Licenses, guarantees, and warranty documents for equipment and systems.
18. Submit one copy for each building, plus two extra copies.

I. Information common to the systems in a single building shall be provided.
1. System architecture diagram for components within the building annotated with specific location information.
2. As-built drawing for each control panel.
3. As-built wiring design diagram for all components.
4. Installation design details for each I/O device.
5. As-built system flow diagram for each system.
6. Sequence of control for each system.
7. Binding map for the building.
8. Product data sheet for each component.
9. Installation data sheet for each component.
10. Submit two copies for each building and two extra copies.

J. Software shall be provided:
1. Submit a copy of all software installed on the servers and workstations.
2. Submit all licensing information for all software installed on the servers and workstations.
3. Submit a copy of all software used to execute the project even if the software was not installed on the servers and workstations.
4. Submit all licensing information for all of the software used to execute the project.
5. All software revisions shall be as installed at the time of the system acceptance.
6. Firmware Files
7. Submit a copy of all firmware files that were downloaded to or pre-installed on any devices installed as part of this project.
8. This does not apply to firmware that is permanently burned on a chip at the factory and can only be replaced by replacing the chip.
9. Submit a copy of all application files that were created during the execution of the project.
10. Submit a copy of all graphic page files created during the execution of the project.

1.10 COORDINATION

A. Coordinate location of control sensors with plans and room details before installation.

B. Coordinate equipment from other divisions including "Intrusion Detection," "Lighting Controls," "Motor Control Centers," "Panel boards," and "Fire Alarm" to achieve compatibility with equipment that interfaces with those systems.

C. Coordinate supply of conditioned electrical circuits for control units.

D. Coordinate with the Owner's IT department on locations for NSC's, Ethernet communication cabling and TCP/IP addresses.

1.11 OWNERSHIP

A. The Owner shall retain licenses to software for this project.

B. The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition off this contractor. Such license shall grant use of all programs and application software to the Owner as defined by the manufacturer's license agreement, but shall protect the manufacturer's rights to disclosure of Trade Secrets contained within such software.

C. The licensing agreement shall not preclude the use of the software by individuals under contract to the owner for commissioning, servicing or altering the system in the future. Use of the software by individuals under contract to the owner shall be restricted to use on the owner's computers and only for the purpose of commissioning, servicing, or altering the installed system.

D. All project developed software, files and documentation shall become the property of the Owner. These include but are not limited to:
1. Server and workstation software
2. Application programming tools
3. Configuration tools
4. Network diagnostic tools
5. Addressing tools
6. Application files
7. Configuration files
8. Graphic files
9. Report files
10. Graphic symbol libraries
11. All documentation

1.12 QUALITY ASSURANCE - SYSTEM STARTUP AND COMMISSIONING

A. Each point in the system shall be tested for both hardware and software functionality. In addition, each mechanical and electrical system under control of the BAS will be tested against the appropriate sequence of operation specified herein. Successful completion of the system test shall constitute the beginning of the warranty period. A written report will be submitted to the owner indicating that the installed system functions in accordance with the plans and specifications.

B. The BAS contractor shall commission and set in operating condition all major equipment and systems, such as the chilled water, hot water and all air handling systems, in the presence of the equipment manufacturer's representatives, as applicable, and the Owner and Architect's representatives.

C. The BAS Contractor shall provide a technician for 5 days manpower and engineering services required to assist the HVAC Contractor and Balancing Contractor in testing, adjusting, and balancing all systems in the building.

The BAS Contractor shall coordinate all requirements to provide a complete air balance with the Balancing Contractor and shall include all labor and materials in his contract.

D. Startup Testing shall be performed for each task on the startup test checklist, which shall be initialed by the technician and dated upon test was completion along with any recorded data such as voltages, offsets or tuning parameters. Any deviations from the submitted installation plan shall also be recorded.

E. Required elements of the startup testing include:
1. Measurement of voltage sources, primary and secondary
2. Verification of proper controller power wiring.
3. Verification of component inventory when compared to the submittals.
4. Verification of labeling on components and wiring.
5. Verification of connection integrity and quality (loose strands and tight connections).
6. Verification of bus topology, grounding of shields and installation of termination devices.
7. Verification of point checkout.
8. Each I/O device is landed per the submittals and functions per the sequence of control.
9. Analog sensors are properly scaled and a value is reported
10. Binary sensors have the correct normal position and the state is correctly reported.
11. Analog outputs have the correct normal position and move full stroke when so commanded.
12. Binary outputs have the correct normal state and respond appropriately to energize/de-energize commands.
13. Documentation of analog sensor calibration (measured value, reported value and calculated offset).
14. Documentation of Loop tuning (sample rate, gain and integral time constant).

F. A performance verification test shall also be completed for the operator interaction with the system. Test elements shall be written to require the verification of all operator interaction tasks including, but not limited to the following.
1. Graphics navigation.
2. Trend data collection and presentation.
3. Alarm handling, acknowledgement and routing.
4. Time schedule editing.
5. Application parameter adjustment.
6. Manual control.
7. Report execution.
8. Automatic backups.
9. Web Client access.

G. A Startup Testing Report and a Performance Verification Testing Report shall be provided upon test completion.

1.13 WARRANTY AND MAINTENANCE

A. All components, system software, and parts furnished and installed by the BMS contractor shall be guaranteed against defects in materials and workmanship for 1 year of substantial completion. Labor to repair, reprogram, or replace these components shall be furnished by the BMS contractor at no charge during normal working hours during the warranty period. Materials furnished but not installed by the BMS contractor shall be covered to the extent of the product only. Installation labor shall be the responsibility of the trade contractor performing the installation. All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks. The Contractor shall respond to the owner's request for warranty service within 24 standard working hours.

1.14 TRAINING

A. On-site training shall consist of a minimum of (40) hours of hands-on instruction geared at the operation and maintenance of the systems. The curriculum shall include
1. System Overview
2. System Software and Operation

3. System access
4. Software features overview
5. Changing setpoints and other attributes
6. Scheduling
7. Editing programmed variables
8. Displaying color graphics
9. Running reports
10. Workstation maintenance
11. Viewing application programming
12. Operational sequences including start-up, shutdown, adjusting and balancing.
13. Equipment maintenance

B. Factory, classroom training will include a minimum of (2) training reservations for a 3 day course with material covering workstation operation tuition free with travel expense responsibility of the owner. The option for 2-3 weeks of system engineering and controller programming shall be possible if necessary and desired.

PART 2 - PRODUCTS

2.1 PRE-APPROVED MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following pre-qualified manufacturers:
1. Electric Components
   a) Schneider-Electric Field Devices
2. Electronic Components
   a) Schneider-Electric Field Devices
3. Direct Digital Control Systems Field Controller Devices:
   a) Schneider Electric EcoStruxure Building MP BACnet series, b3 BACnet series, MNB BACnet installed by approved manufacturer's local field office.
   b) Or approved equal.

2.2 SYSTEM ARCHITECTURE

A. General
1. The Building Automation System (BAS) shall consist of Network Server/Controllers (NSCs) and a family of Standalone Digital Control Units (SDCUs). The BAS shall provide control, alarm detection, scheduling, reporting and information management for the entire facility, and Wide Area Network (WAN) if applicable.
2. An Enterprise Level BAS shall consist of an Enterprise Server, which enables multiple NSCs (including all graphics, alarms, schedules, trends, programming, and configuration) to be accessible from a single Workstation simultaneously for operations and engineering tasks.
3. The Enterprise Level BAS shall be able to host up to 250 servers, or NSCs, beneath it.
4. For Enterprise reporting capability and robust reporting capability outside of the trend chart and listing ability of the Workstation, a Reports Server shall be installed on a Microsoft Windows SQL based computer. The Reports Server can be installed on the same computer as the Enterprise Server.
5. The system shall be designed with a top-level 10/100bT Ethernet network, using the BACnet/IP, LonWorks IP, and/or Modbus TCP protocol.

B. Modbus RTU/ASCII (and J-bus), Modbus TCP, BACnet MS/TP, BACnet IP, LonTalk FTT-10A, and WebServices shall be native to the NSCs. There shall not be a need to provide multiple NSCs to support all the network protocols, nor should there be a need to supply additional software to allow all three protocols to be natively supported.

C. A sub-network of SDCUs using the BACnet IP, BACnet MS/TP protocol shall connect the local, stand-alone controllers with Ethernet-level Network Server Controllers/IP Routers.

D. TCP/IP Level

1. The TCP/IP layer connects all of the buildings on a single Wide Area Network (WAN) isolated behind the campus firewall. Fixed IP addresses for connections to the campus WAN shall be used for each device that connects to the WAN.

E. Fieldbus Level with Standalone Digital Control Units (SDCUs)
1. The fieldbus layer shall support all of the following types of SDCUs:
a) BACnet IP SDCU requirements: The system shall consist of one or more BACnet/IP field buses managed by the Network Server Controller. The field bus layer shall consist of up to 50 IP SDCUs in daisy chain topology, or 39 if using RSTP, per layer, with a max of 5 sub networks in daisy chain for a total of 250 SDCUs or 6 sub networks in RSTP for a total of 234 SDCUs.
b) BACnet MS/TP SDCU requirements: The system shall consist of one or more BACnet MS/TP field buses managed by the Network Server Controller. Minimum speed shall be 76.8kbps. The field bus layer consists of an RS485, token passing bus that supports up to 127 Standalone Digital Control Units (SDCUs) for operation of HVAC and lighting equipment. These devices shall conform to BACnet standard 135-2004. The NSCs shall be capable of at least two BACnet MS/TP field buses for a total capability of 254 SDCUs per NSC.

F. BAS LAN Segmentation
1. The BAS shall be capable of being segmented, through software, into multiple local area networks (LANs) distributed over a wide area network (WAN). Workstations can manage a single LAN (or building), and/or the entire system with all portions of that LAN maintaining its own, current database.

G. Standard Network Support
1. All NSCs, Workstation(s) and Servers shall be capable of residing directly on the owner's Ethernet TCP/IP LAN/WAN with no required gateways. Furthermore, the NSC's, Workstation(s), and Server(s) shall be capable of using standard, commercially available, off-the-shelf Ethernet infrastructure components such as routers, switches and hubs. With this design the owner may utilize the investment of an existing or new enterprise network or structured cabling system. This also allows the option of the maintenance of the LAN/WAN to be performed by the owner's Information Systems Department as all devices utilize standard TCP/IP components.

H. System Expansion
1. The BAS system shall be scalable and expandable at all levels of the system using the same software interface, and the same TCP/IP level and fieldbus level controllers. Systems that require replacement of either the workstation software or field controllers in order to expand the system shall not be acceptable.
2. Web-based operation shall be supported directly by the NSCs and require no additional software.
3. The system shall be capable of using graphical and/or line application programming language for the Network Server Controllers.

I. Support For Open Systems Protocols
1. All Network Server Controllers must natively support the BACnet IP, BACnet MS/TP, LonWorks FTT-10, Modbus TCP, Modbus RTU (RS-485 and RS-232), and Modbus ASCII protocols.

2.3 NETWORK SERVER CONTROLLERS (NSCS)

A. Network Router Controllers shall combine both network routing functions, control functions, and server functions into a single unit.

B. The BACnet NSC shall be classified as a "native" BACnet device, supporting the BACnet Network Server Controller (B-BC) profile. Controllers that support a lesser profile such as B-SA are not acceptable. NSCs shall be tested and certified by the BACnet Testing Laboratory (BTL) as BACnet Network Server Controllers (B-BC).

C. The Network Server Controller shall provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NRS.

D. The NSCs shall be capable of whitelisting IPs to restrict access to a pre-defined list of hosts or devices.

E. Whitelisting of file extensions for documents shall be capable.

F. Encrypted and authenticated communication shall be configurable for non-open protocol communications using TLS 1.2

G. The NSCs shall support Simple Network Management Protocol version 3 (SNMPv3) for monitoring of the NSCs using a Network Management Tool.

H. The NSCs shall support remote system logging for used by System Information and Event Monitoring (SIEM) software.

I. They shall also be responsible for monitoring and controlling their own HVAC equipment such as an AHU or boiler.

J. They shall also contain graphics, trends, trend charts, alarm views, and other similar presentation objects that can be served to workstations or web-based interfaces. A sufficient number of NSCs shall be supplied to fully meet the requirements of this specification and the attached point list.

K. It shall be capable of executing application control programs to provide:
1. Calendar functions
2. Scheduling
3. Trending
4. Alarm monitoring and routing
5. Time synchronization by means of an Internet site including automatic synchronization
6. Native integration of LonWorks controller data and Modbus controller data or BACnet controller data and Modbus controller data
7. Network Management functions for all LonWorks based devices

L. Hardware Specifications
1. Memory:
   a) The operating system of the controller, application programs, and all other portions of the configuration database, shall be stored in non-volatile, FLASH memory. Servers/Controllers shall contain enough memory for the current application, plus required history logging, plus a minimum of 20% additional free memory.
2. Each NSC shall provide the following on-board hardware for communication:
   a) Two 10/100b Ethernet for communication to Workstations, other NRCs, IP field bus controllers, other SDCUs, and onto the internet.
      i. The two Ethernet ports shall support active switch and BACnet/IP communication protocols.
      ii. Support IPv4 addressing
      iii. Ethernet port 1 shall support static or DHCP client configuration for communication to Workstation or other NSCs
      iv. Ethernet port 2 shall support switch mode or DHCP server to set addressing of DHCP client devices
      v. It shall be possible to disable Ethernet port 2
      vi. In DHCP server mode, the Ethernet port 2 shall support 50 BACnet/IP field controllers in daisy chain configuration directly from the port
      vii. Each NSC shall be able to support a total of 250 IP SDCUs in daisy chain configuration (5 sub networks via switch)
      viii. If using RSTP (Rapid Spanning Tree Protocol) with a managed switch (with IEEE 802.1W or IEEE 802.1Q-2014 support), Ethernet port 2 shall support up to 39 devices
      ix. Each NSC shall be able to support a total of 234 IP SDCUs in RSTP configuration (6 sub networks via managed switch)
      x. Where a switch is needed, use a Cisco 9000 Catalyst or IE switch, EtherWAN EX63402-01B, or other equal and approved equivalent.
   b) Two RS-485 ports for communication to BACnet MSTP bus or serial Modbus (software configurable)
   c) One TP/FT port for communication to LonWorks devices.

d) One device USB port
e) One host USB port

3. The NSC shall conform to a small footprint no larger than 100W x 125H x 75D mm (3.94W x 4.92H x 2.95D in).

M. Modular Expandability:
1. The system shall employ a modular I/O design to allow expansion. Input and output capacity is to be provided through plug-in modules of various types. It shall be possible to combine I/O modules as desired to meet the I/O requirements for individual control applications.
2. One shall be able to "hot-change" (hot-swap) the I/O modules preserving the system on-line without any intervention on the software; addressing and configuration shall be automatic.
3. If for any reason the backplane of the modular I/O system were to fail, I/O module addresses will be protected.

N. Hardware Override Switches:
1. All digital outputs shall, optionally, include three position manual override switches to allow selection of the ON, OFF, or AUTO output state. These switches shall be built into the unit and shall provide feedback to the controller so that the position of the override switch can be obtained through software. In addition each analog output shall be equipped with an override potentiometer to allow manual adjustment of the analog output signal over its full range, when the 3 position manual override switch is placed in the ON position.

O. Universal Input Temperatures
1. All universal inputs directly connected to the NSC via modular expansion shall be capable of using the following thermistors for use in the system without any external converters needed.
a) 10 kohm Type I (Continuum)
b) 10 kohm Type II (I/NET)
c) 10 kohm Type III (Satchwell)
d) 10 kohm Type IV (FD)
e) Linearized 10 kohm Type V (FD w/11k shunt)
f) Linearized 10 kohm (Satchwell)
g) 1.8 kohm (Xenta)
h) 1 kohm (Balco)
i) 20 kohm (Honeywell)
j) 2.2 kohm (Johnson)
2. In addition to the above, the system shall be capable of using the below RTD sensors, however it is not required that all universal inputs be compatible with them.
a) PT100 (Siemens)
b) PT1000 (Sauter)
c) Ni1000 (Danfoss)

2.4 BACNET IP FIELDBUS CONTROLLERS

A. Controllers – BACnet/IP Protocol
1. All BACnet/IP Fieldbus controllers shall be BACnet Testing Laboratory listed (v12 or later) as specified BACnet Advanced Application Controller (B-AAC)
2. All BACnet/IP Fieldbus controllers shall use the following communication specifications and achieve performance as specified herein:
a) All controllers shall be able to communicate peer-to-peer without the need for a NSC
b) Any BACnet/IP Fieldbus controllers on the Ethernet Data Link/Physical layer shall be able to act as a Master to allow for the exchange and sharing of data variables and messages with any other controller connected on the same communication cabling. Slave controllers are not acceptable.

B. The BACnet/IP Fieldbus controllers shall be equipped with 2x 10/100bT Ethernet communication ports with active switch and will support BACnet/IP communication protocols with the following configurations:
1. Supporting IPv4 addressing

2. Supporting Static IP setting, DHCP client and Auto-IP address acquision
3. It shall be possible to disable Ethernet port 2

C. Topologies
1. BACnet/IP Fieldbus controllers shall support daisy chain topology of up to 50 controllers. In case of any disruption to the communication, a system alarm shall notify the NSC/BMS of the point disruption has occurred.
2. BACnet/IP Fieldbus Controllers shall support RSTP loop whereby up to 39 controllers are supported.
   a) In case of any disruption there shall be no communication interruption
   b) In case of any disruption there shall be system alarms that will inform the operator of the disruption

D. Performance
1. Each BACnet/IP Fieldbus Controllers shall have a 32-bit microprocessor operating at 500 MHz and support a BACnet protocol stack in accordance with the ANSI/ASHRAE Standard 135-2008 and the BACnet Device Profile supported.
2. They shall be multi-tasking, real-time digital control processors consisting of communication controllers, controls processing, power supplies with built-in inputs and outputs.

2.5 DDC SENSORS AND POINT HARDWARE

A. Temperature Sensors
1. Acceptable Manufacturers: Veris Industries
2. All temperature devices shall use precision thermistors accurate to +/- 1 degree F over a range of –30 to 230 degrees F. Space temperature sensors shall be accurate to +/- .5 degrees F over a range of 40 to 100 degrees F.
3. Pipe Immersion Sensor: Immersion sensors shall be employed for measurement of temperature in all chilled and hot water applications as well as refrigerant applications. Provide sensor probe length suitable for application. Provide each sensor with a corresponding pipe-mounted sensor well, unless indicated otherwise. Sensor wells shall be stainless steel for non-corrosive fluids below 250 degrees F and 300 series stainless steel for all other applications. Basis of Design: Veris TI Series
4. Outside Air Sensor: Provide the sensing element on the building's north side. Sensing element shall be fully encapsulated in potting material within a stainless steel probe. Probe shall be encased in PVC solar radiation shield and mounted in a weatherproof enclosure. Operating range -40 to 122 F, Basis of Design: Veris TO Series
5. A pneumatic signal shall not be allowed for sensing temperature.

B. Liquid Differential Pressure Transmitters:
1. Acceptable Manufacturer: Veris Industries
2. Transmitter shall be microprocessor based
3. Transmitter shall use two independent gauge pressure sensors to measure and calculate differential pressure
4. Transmitter shall have 4 switch selectable ranges
5. Transmitter shall have test mode to produce full-scale output automatically.
6. Transmitter shall have provision for zeroing by pushbutton or digital input.
7. Transmitter shall have field selectable outputs of 0-5V, 0-10V, and 4-20mA.
8. Transmitter shall have field selectable electronic surge damping
9. Transmitter shall have an electronic port swap feature
10. Transmitter shall accept 12-30 VDC or 24 VAC supply power
11. Sensor shall be 17-4 PH stainless steel where it contacts the working fluid.
12. Performance:
    a) Accuracy shall be ±1% F.S. and ±2% F.S. for lowest selectable range
    b) Long term stability shall be ±0.25%
    c) Sensor temperature operating range shall be -4° to 185°F
    d) Operating environment shall be 14° to 131°F; 10-90% RH noncondensing
    e) Proof pressure shall be 2x max. F.S. range
    f) Burst pressure shall be 5x max. F.S. range
13. Transmitter shall be encased in a NEMA 4 enclosure
14. Enclosure shall be white powder-coated aluminum

15. Transmitter shall be available with a certification of NIST calibration
16. Basis of Design: Veris PW

C. Current Sensors
1. Current status switches shall be used to monitor fans, pumps, motors and electrical loads. Current switches shall be available in split core models, and offer either a digital or an analog signal to the automation system. Acceptable manufacturer is Veris Industries

D. Current Status Switches for Constant Load Devices
1. Acceptable Manufacturer: Veris Industries
2. General: Factory programmed current sensor to detect motor undercurrent situations such as belt or coupling loss on constant loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory.
3. Visual LED indicator for status.
4. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 0.5 A to 175 A.
5. Normally open current sensor output. 0.1A at 30 VAC/DC.
6. Basis of Design: Veris Model H608.

E. Current Status Switches for Constant Load Devices (Auto Calibration)
1. Acceptable Manufacturer: Veris Industries.
2. General: Microprocessor based, self-learning, self-calibrating current switch. Calibration-free status for both under and overcurrent, LCD display, and slide-switch selectable trip point limits. At initial power-up automatically learns average current on the line with no action required by the installer
3. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 2.5 A to 200 A.
4. Display: Backlit LCD; illuminates when monitored current exceeds 4.5A
5. Nominal Trip Point: ±40%, ±60%, or on/off (user selectable)
6. Normally open current sensor output. 0.1A at 30 VAC/DC.
7. Basis of Design: Veris Model H11D.

F. Current Status Switches for Variable Frequency Drive Application
1. Acceptable Manufacturer: Veris Industries.
2. General: Microprocessor controlled, self-learning, self-calibrating current sensor to detect motor undercurrent and overcurrent situations such as belt loss, coupling shear, and mechanical failure on variable loads. Sensor shall store motor current as operating parameter in non-volatile memory. Push-button to clear memory and relearn.
3. Visual LED indicator for status.
4. Alarm Limits: ±20% of learned current in every 5 Hz freq. band
5. Split core sensor, induced powered from monitored load and isolated to 600 VAC rms. Sensor shall indicate status from 1.5 A to 150 A and from 12 to 115 Hz.
6. Normally open current sensor output. 0.1A at 30 VAC/DC.
7. Basis of Design: Veris Model H614.

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

A. General
1. Installation of the building automation system shall be performed by the Contractor or a subcontractor. However, all installation shall be under the personal supervision of the Contractor. The Contractor shall certify all work as proper and complete. Under no circumstances shall the design, scheduling, coordination, programming, training, and warranty requirements for the project be delegated to a subcontractor.

B. Demolition

1. Remove controls which do not remain as part of the building automation system, all associated abandoned wiring and conduit, and all associated pneumatic tubing. The Owner will inform the Contractor of any equipment which is to be removed that will remain the property of the Owner. All other equipment which is removed will be disposed of by the Contractor.

C. Access to Site
1. Unless notified otherwise, entrance to building is restricted. No one will be permitted to enter the building unless their names have been cleared with the Owner or the Owner's Representative.

D. Code Compliance
1. All wiring shall be installed in accordance with all applicable electrical codes and will comply with equipment manufacturer's recommendations. Should any discrepancy be found between wiring specifications in Division 17 and Division 16, wiring requirements of Division 17 will prevail for work specified in Division 17.

E. Cleanup
1. At the completion of the work, all equipment pertinent to this contract shall be checked and thoroughly cleaned, and all other areas shall be cleaned around equipment provided under this contract.

3.2 WIRING, CONDUIT, AND CABLE

A. All wire will be copper and meet the minimum wire size and insulation class listed below:

Wire Class	Wire Size	Isolation Class
Power	12 Gauge	600 Volt
Class One	14 Gauge Std.	600 Volt
Class Two	18 Gauge Std.	300 Volt
Class Three	18 Gauge Std.	300 Volt
Communications	Per Mfr.	Per Mfr.

B. Power and Class One wiring may be run in the same conduit. Class Two and Three wiring and communications wiring may be run in the same conduit.

C. Where different wiring classes terminate within the same enclosure, maintain clearances and install barriers per the National Electric Code.

D. Where wiring is required to be installed in conduit, EMT shall be used. Conduit shall be minimum 1/2 inch galvanized EMT. Set screw fittings are acceptable for dry interior locations. Watertight compression fittings shall be used for exterior locations and interior locations subject to moisture. Provide conduit seal-off fitting where exterior conduits enter the building or between areas of high temperature/moisture differential.

E. Flexible metallic conduit (max. 3 feet) shall be used for connections to motors, actuators, controllers, and sensors mounted on vibration producing equipment. Liquid-tight flexible conduit shall be use in exterior locations and interior locations subject to moisture.

F. Junction boxes shall be provided at all cable splices, equipment termination, and transitions from EMT to flexible conduit. Interior dry location J-boxes shall be galvanized pressed steel, nominal four-inch square with blank cover. Exterior and damp location JH-boxes shall be cast alloy FS boxes with threaded hubs and gasketed covers.

G. Where the space above the ceiling is a supply or return air plenum, the wiring shall be plenum rated. Teflon wiring can be run without conduit above suspended ceilings. EXCEPTION: Any wire run in suspended ceilings that is used to control outside air dampers or to connect the system to the fire management system shall be in conduit.

H. Fiber optic cable shall include the following sizes; 50/125, 62.5/125 or 100/140.

I. Only glass fiber is acceptable, no plastic.

J. Fiber optic cable shall only be installed and terminated by an experienced contractor. The BAS contractor shall submit to the Engineer the name of the intended contractor of the fiber optic cable with his submittal documents.

3.3 HARDWARE INSTALLATION PRACTICES FOR WIRING

A. All controllers are to be mounted vertically and per the manufacturer's installation documentation.

B. The 120VAC power wiring to each Ethernet or Remote Site controller shall be a dedicated run, with a separate breaker. Each run will include a separate hot, neutral and ground wire. The ground wire will terminate at the breaker panel ground. This circuit will not feed any other circuit or device.

C. A true earth ground must be available in the building. Do not use a corroded or galvanized pipe, or structural steel.

D. Wires are to be attached to the building proper at regular intervals such that wiring does not droop. Wires are not to be affixed to or supported by pipes, conduit, etc.

E. Conduit in finished areas will be concealed in ceiling cavity spaces, plenums, furred spaces and wall construction. Exception; metallic surface raceway may be used in finished areas on masonry walls. All surface raceway in finished areas must be color matched to the existing finish within the limitations of standard manufactured colors.

F. Conduit, in non-finished areas where possible, will be concealed in ceiling cavity spaces, plenums, furred spaces, and wall construction. Exposed conduit will run parallel to or at right angles to the building structure.

G. Wires are to be kept a minimum of three (3) inches from hot water, steam, or condensate piping.

H. Where sensor wires leave the conduit system, they are to be protected by a plastic insert.

I. Wire will not be allowed to run across telephone equipment areas.

J. Provide fire caulking at all rated penetrations.

3.4 INSTALLATION PRACTICES FOR FIELD DEVICES

A. Well-mounted sensors will include thermal conducting compound within the well to insure good heat transfer to the sensor.

B. Actuators will be firmly mounted to give positive movement and linkage will be adjusted to give smooth continuous movement throughout 100 percent of the stroke.

C. Relay outputs will include transient suppression across all coils. Suppression devices shall limit transients to 150% of the rated coil voltage.

D. Water line mounted sensors shall be removable without shutting down the system in which they are installed.

3.5 ENCLOSURES

A. For all I/O requiring field interface devices, these devices where practical will be mounted in a field interface panel (FIP). The Contractor shall provide an enclosure which protects the device(s) from dust, moisture, conceals integral wiring and moving parts.

B. FIPs shall contain power supplies for sensors, interface relays and contactors, and safety circuits.

C. The FIP enclosure shall be of steel construction with baked enamel finish; NEMA 1 rated with a hinged door and keyed lock. The enclosure will be sized for twenty percent spare mounting space. All locks will be keyed identically.

D. All wiring to and from the FIP will be to screw type terminals. Analog or communications wiring may use the FIP as a raceway without terminating. The use of wire nuts within the FIP is prohibited.

E. All outside mounted enclosures shall meet the NEMA-4 rating.

F. The wiring within all enclosures shall be run in plastic track. Wiring within controllers shall be wrapped and secured.

3.6 IDENTIFICATION

A. Identify all control wires with labeling tape or sleeves using words, letters, or numbers that can be exactly cross-referenced with as-built drawings.

B. All field enclosures, other than controllers, shall be identified with a Bakelite nameplate. The lettering shall be in white against a black or blue background.

C. Junction box covers will be marked to indicate that they are a part of the BAS system.

D. All I/O field devices (except space sensors) that are not mounted within FIP's shall be identified with name plates.

E. All I/O field devices inside FIP's shall be labeled.

3.7 EXISTING CONTROLS

A. Existing controls which are to be reused must each be tested and calibrated for proper operation. Existing controls which are to be reused and are found to be defective requiring replacement, will be noted to the Owner. The Owner will be responsible for all material and labor costs associated with their repair.

3.8 CONTROL SYSTEM SWITCH-OVER

A. Demolition of the existing control system will occur after the new temperature control system is in place including new sensors and new field interface devices.

B. Switch-over from the existing control system to the new system will be fully coordinated with the Owner. A representative of the Owner will be on site during switch-over.

C. The Contractor shall minimize control system downtime during switch-over. Sufficient installation mechanics will be on site so that the entire switch-over can be accomplished in a reasonable time frame.

END OF SECTION 230923

SECTION 232113 - HYDRONIC PIPING AND ACCESSORIES

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Hydronic Piping and Accessories indicated on Drawings and specified herein.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only. Use the latest edition of each reference.

ANSI B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ANSI B18.2.1	Square and Hex Bolts and Screws - Inches Series
ANSI/ASME Code	Boiler and Pressure Vessel Code
ANSI/ASME B1.1	Unified Inch Screw Threads (UN and UNR Thread Form)
ANSI/ASME B16.1	Cast Iron pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800
ANSI/ASME B16.3	Malleable Iron Threaded Fittings Class 50 and 300
ANSI/ASME B16.5	Pipe Flanges and Flanged Fittings
ANSI/ASME B16.9	Factory-Made Wrought Steel Buttwelding Fittings
ANSI/ASME B16.10	Face-to-Face and End-to-End Dimensions of Valves
ANSI/ASME B16.22	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ANSI/ASME B16.39	Pipe Unions, Malleable Iron Threaded
ANSI/ASME B18.2.2	Square and Hex Nuts (Inch Series)
ANSI/ASME B31.1	Power Piping
ANSI/ASME B31.9	Building Services Piping Code
ANSI/AWWA C-606	Grooved and Shouldered Joints
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A 47	Ferritic Malleable Iron Castings
ASTM A 105/A 105M	Forgings, Carbon Steel, for Piping Components
ASTM A 536	Standard Specification for Ductile Iron Castings
ASTM A 126	Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A 193/A 193M	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
ASTM A 194/A 194M	Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
ASTM A 234/A 234M	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A 307	Carbon Steel Bolts and Studs, 60000 psi Tensile
ASTM A 312	Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel
ASTM A 385	High Quality Zinc Coatings (Hot-Dip)
ASTM B 32	Solder Metal
ASTM B 62	Composition Bronze or Dunce Metal Castings
ASTM B 88	Seamless Copper Water Tube
AWWA C105/A21.5	Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids

AWWA C-606	Grooved and Shouldered Joints
MSS SP-25	Standard Marking System for Valves, Fittings, Flanges and Unions
MSS SP-67	Butterfly Valves
MSS SP-71	Cast Iron Swing Check Valves, Flanged and Threaded Ends
MSS SP-80	Bronze Gate, Globe, Angle and Check Valves

1.4 SYSTEM DESCRIPTION

A. 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 in open systems. (Condenser water piping).

D. Provide pipe hangers and supports in accordance with ASTM B31.9, MSS SP69 unless indicated otherwise.

E. Use 3/4 inch ball valves with cap for drains at main shut-off valves, low points of piping, bases of vertical risers, and at equipment.

1.5 REQULATORY REQUIREMENTS

A. Conform to ASME B31.9 code for installation of piping system.

B. Welding Materials and Procedures: Conform to ASME and applicable state labor regulations.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 3 years experience.
   1. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
   2. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

B. Installer: Company specializing in performing the work of this section with minimum 3 years experience.

C. Welders: Certify in accordance with ANSI/ASME Code.

1.7 SUBMITTALS

A. Provide product data on pipe material, pipe fittings, valves and accessories. Provide manufacturers catalog information. Include valve data and ratings.

B. Manufacturer's installation instructions: Indicate hanging and support methods, joining procedures, and maintenance procedures.

C. Manufacturer's warranty information.

1.8 SUBMITTALS at PROJECT CLOSEOUT

A. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

PART 2 — PRODUCTS

2.1 CHILLED or HEATING WATER PIPING

A. Steel Pipe (2″ and larger): ASTM A53, Schedule 40, black.
   1. Fittings: ASTM A 234/A 234M, ANSI/ASME B16.9, forged steel welding type or grooved end.
   2. Elbows: Long radius type.
   3. Joints: Grooved or welded.
   4. Flanges: ASTM A 105/A 105M, forged carbon steel, welding-neck type, 1/16 inch raised face, ANSI/ASME B16.5.
   5. Flange Adapter: ASTM A-536, ductile iron, flat face, for direct connection to ANSI Class 125 or 150 flanged components.
   6. Unions: ANSI/ASME B16.39, malleable iron, ground joint, screwed, bronze-to-bronze seat.

B. Copper Tubing (1-1/2″ and Smaller): ASTM B88, Type L, hard drawn.
   1. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
   2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.2 MECHANICAL-GROOVED COUPLINGS AND FITTINGS

A. Manufacturers:
   1. Victaulic.
   2. Anvil International – Gruvlok

B. Allowed above ground in mechanical rooms, risers, and pipe chases on the following systems:
   1. Chilled water.
   2. Hot water.

C. Fittings: ASTM A 536, Grade 65-45-12, ductile iron casting.

D. Couplings: Ductile iron conforming to ASTM A-536, grade 65-45-12, designed to engage, lock, and permit some angular deflection, contraction, and expansion where required.
   1. Steel Piping to 12 Inches:
      a) Rigid Type: Housings shall be cast with offsetting angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with ANSI B31.1 and B31.9.
         i. 2 through 8 Inches: Installation-Ready couplings, designed for direct stab installation without field disassembly, with grade EHP gasket rated to +250 deg F. Victaulic Style 107-Quick-Vic.

E. Sealing Gasket:
   1. Grade EHP, suitable for operating temperatures to +250 deg F.
   2. C-shape, non-asbestos, EPDM, suitable for operating temperature to +230 deg F and pressure of piping system.

F. Accessories: Electroplated steel bolts, nuts, and washers.

G. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

2.3 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tubing: ASTM B88, Type M, hard drawn.
   1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
   2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.4 PIPE HANGERS AND SUPPORTS

A. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.

B. Refer to Section 23 05 29; "Hangers and Supports for HVAC Piping and Equipment"

2.5 UNIONS, FLANGES, AND COUPLINGS

A. Unions for Pipe 2 Inches and Under:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe Over 2 Inches:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick preformed neoprene.

2.6 DIELECTRIC UNIONS, WATERWAY FITTINGS, AND FLANGES

A. Manufacturers:
   1. Victaulic 47.
   2. Anvil International – Gruvlok.
   3. Watts.

B. Construction:
   1. Suitable for the pressures and temperatures of systems in which installed.
   2. Union and Waterway Ends: Grooved, Threaded, or soldered to match adjacent piping.
   3. Flanges: Welding neck, threaded, or soldered to match adjacent piping.
   4. Metal parts of dielectric unions and flanges separated such that electrical current is below 1 percent of galvanic current that would exist with metal-to-metal contact.
   5. Factory-certified to withstand a minimum of 600 volts on a dry line with no flashover.

2.7 BOLTS, STUDS, AND NUTS

A. General:
   1. ANSI/ASME B31.1, carbon-steel or chromium-molybdenum steel for steel piping and stainless steel for all other piping and tubing. Diameters 1-inch and smaller; course thread series. Diameters larger than 1-inch; 8-thread series, ANSI/ASME B1.1, Class 2A fit.

B. Bolts:
   1. Carbon Steel: ASTM A 307 and ANSI B18.2.1, hexagonal-head, semifinished.
   2. Stainless Steel: ASTM A 193/A 193M and ANSI B18.2.1, Grade B8, Class 2, hexagonal-head, semifinished.

C. Studs:
   1. Chromium-molybdenum Steel: ASTM A 193/A 193M, continuously threaded.
   2. Stainless Steel: ASTM A 193/A 193M and ANSI/ASME B18.2.2, Grade B8, Class 2, continuously threaded.

D. Nuts:
   1. Carbon Steel: ASTM A 194/A 194M, semifinished, hexagonal, heavy-hex series, Grade 2H.
   2. Stainless Steel: ASTM A 194/A 194M, and ANSI/ASME B18.2.2, hexagonal, heavy-hex series, Grade 8.

2.8 BALL VALVES

A. Soldered Ends - Up to and Including 2 Inches:

1. Manufacturers:
   a) Nibco Model S-585-70.
   b) Milwaukee.
   c) Hammond.
   d) Kitz.
2. Bronze two piece full port body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle, solder ends.

B. Grooved:
1. Victaulic Series 726.
2. 800-psig CWP, two-piece-ductile iron bodies, PTFE seat, conventional port, blow-out proof stem, chrome-plated steel or stainless-steel ball and stem, grooved ends.

2.9 GATE VALVES

A. Cast-Iron Valves:
1. MSS SP-70.

B. Bronze valves:
1. MSS SP-80.

C. Up To and Including 2 Inches:
1. Manufacturers:
   a) Threaded Class 125
      Nibco T-124.
      Stockham B-105.
      Hammond 1B640.
      Solder Class 125
      Nibco S-111.
      Stockham B-108.
      Hammond IB635.
   b) Threaded Class 150
      Nibco T-134.
      Stockham B120.
      Hammond IB629.
      Solder Class 150
      Nibco S-134.
      Stockham B124.
      Hammond IB648.
2. Class 125 or Class 150, cast bronze body and union bonnet; ASTM B 62, rising stem of silicon bronze, bronze packing gland, Teflon-impregnated packing, threaded or soldered ends to match pipe, bronze solid disc, inside screw, malleable iron handwheel.

2.10 GLOBE VALVES

A. Cast-Iron Valves:
1. MSS SP-85.

B. Bronze Valves:
1. MSS SP-80.

C. Up To and Including 2 Inches:
1. Manufacturers:
   a) Crane 14 1/2P.
   b) Stockham B-29.
   c) Powell 2600.
   d) Milwaukee 591A.
2. Class 150 body and union bonnet of ASTM B 62 cast bronze, threaded ends, inside screw rising stem of bronze, stainless steel plug-type disk, stainless steel seat rings, brass packing gland, Teflon-impregnated packing, and malleable-iron handwheel.

2.11 BUTTERFLY VALVES

A. Flanged Ends:

1. Manufacturers:
   a) Nibco Model LD2000-3/LD2000-5.
   b) Milwaukee.
   c) Hammond.
   d) Kitz.
2. Ductile iron body with EPDM seat, wafer ends, extended neck, aluminum bronze disc.
3. Operator: 10 position lever handle for valves through 4 inch size. Gear operator for valves five inches and above.

B. Lug-wafer type, cast iron ASTM A 385, aluminum-bronze disc, stainless steel stem, resilient replaceable EPDM seat, extended neck, infinite-position lever handle with memory stop for 2-1/2 inches through 4 inches, 150-psi working pressure.

2.12 FLEXIBLE PIPE CONNECTORS

A. Steel Piping:
1. Manufacturers:
   a) Hyspan Model 4510.
   b) Flexonics Model 401M.
   c) Metraflex Model ML/SL.
2. Inner Hose: Stainless Steel.
3. Exterior Sleeve: Single braided stainless steel.
4. Pressure Rating: 125 psig WSP and 450 degrees F.
5. Joint: As specified for pipe joints.
6. Size: Use pipe sized units.
7. Maximum offset: 1 inch on each side of installed center line.

2.13 PRESSURE GUAGES

A. Manufacturers:
1. Weiss.
2. Trerice.
3. Weksler.
4. Ashcroft.

B. Gage: Bourdon tube, rotary brass movement, brass socket, front recalibration adjustment, black scale on white background.
1. Case: Steel.
2. Bourdon Tube: Brass.
3. Dial Size: 3-1/2 inch diameter.
4. Mid-Scale Accuracy: Two percent.
5. Scale: Psi.

2.14 PRESSURE GUAGE TAPS

A. Gage Cock: Tee or lever handle, brass for maximum 150 psig.

B. Needle Valve: Brass for maximum 150 psig.

C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

2.15 THERMOMETERS

A. Manufacturers:
1. Weiss.

2. Trerice.
3. Weksler.
4. Ashcroft.

B. Stem Type Thermometers:
1. ASTM E1, 9 inch scale, adjustable angle, red appearing mercury, lens front tube, cast aluminum case with enamel finish and clear glass window, 6 inch brass stem, cast aluminum adjustable joint with positive locking device, 2 percent of scale accuracy to ASTM E77, scale calibrated in degrees F.

C. Thermometer Supports:
1. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
2. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.16 TEST PLUGS

A. Test Plug: 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F, Nordel core for temperatures up to 350 degrees F, Viton core for temperatures up to 400 degrees F.

B. Test Kit: Carrying case internally padded and fitted containing one 3-1/2 inch diameter pressure gages, one gage adapters with 1/8 inch probes, two 1-1/2 inch dial thermometers.

2.17 AIR VENTS

A. 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.

B. Float Type:
1. Manufacturers:
a) Bell & Gosset Model 107.
b) Taco.
c) Armstrong.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

2.18 PRESSURE REDUCING VALVES FOR MAKE UP WATER SYSTEMS

A. Manufacturers:
1. Watts.
2. Taco.
3. Bell & Gossett.

B. Bronze or iron body, low-inlet pressure check valve, brass working parts, built-in removable strainer and adjustable pressure setting. Provide with pressure gauge.

2.19 Y-TYPE STRAINERS

A. Manufacturers:
1. Armstrong.
2. Spirax Sarco.
3. Mueller.
4. Victaulic

B. Up to and Including 2 Inches:
   1. Cast bronze body for 175-psig working pressure, threaded ends, Y pattern with 0.045 inch perforated stainless steel screen with net free area equal to at least 4 times area of pipe inlet.

C. Over 2 Inches:
   1. Cast or ductile iron body for 175-psig working pressure, flanged or grooved ends, Y pattern with stainless steel screen with net free area equal to at least 2 times area of pipe inlet.

2.20 RELIEF VALVES

A. Manufacturers:
   1. Watts Model 174A.
   2. Other acceptable manufacturers offering equivalent products.
      a) Bell & Gossett.
      b) Armstrong.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

PART 3 — EXECUTION

3.1 PREPARATION

A. Cut pipe accurately to measurements established at job site.

B. Ream pipe and tube ends. Remove burrs. Bevel or groove plain end ferrous pipe.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment with flanges, grooved joint couplings, or unions.

E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

F. After completion, fill, clean, and treat systems.

3.2 INSTALLATION – PIPING

A. Install piping to ASME B31.9.

B. Route piping in orderly manner, parallel to building structure, and maintain gradient.

C. Install piping to conserve building space, and not interfere with use of space.

D. Group piping whenever practical at common elevations.

E. Sleeve pipe passing through partitions, walls and floors.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

J. Install valves with stems upright or horizontal, not inverted.

K. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.

L. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where indicated.

M. Grooving tools shall be of the same manufacturer as the grooved components.

3.3 JOINTS

A. Solder:
1. Cut tubing square, ream ends and remove all filings and dust from interior of tube.
2. Apply solder through feed holes and draw through full fitting length.
3. Wipe excess solder from joint before joint hardens.

B. Threaded:
1. Make with properly cut tapered threads.
2. Make tight with mixture of litharge and glycerin, Teflon tape, or other approved thread joint compound. Apply to male threads only.
3. Expose no more than three threads when joint is complete.
4. Clean joint after tightening.

C. Welded:
1. Fusion weld in accordance with ANSI/ASME B31.9.
2. Make branch connections with welding tees or forged welding branch outlets.
3. Make field or shop bevels by mechanical means or flame cutting. Where performed by flame cutting clean of scale and oxidation prior to welding.
4. Alignment: Align components to be welded so that any offset is less than 20-percent of the pipe wall thickness prior to welding. Maintain alignment during welding process.
5. Erection: When temperature of components being welded is below 32 degrees F, heat material 3 feet on each side of weld to 100 degrees F prior to welding. Finish weld before material cools to 32 degrees F.
6. Electrodes: Store in dry, heated area and keep free of moisture during fabrication operations. Discard electrodes that have lost part of their coatings or have been wetted.
7. Defective Welds: Remove and replace. Repairing by adding new material over the defects or by peening is not permitted.

D. Grooved:
1. Grooved joint piping systems shall be installed in accordance with the manufacturer's guidelines and recommendations.
2. The gasket style and elastomeric material (grade) shall be verified as suitable for the intended service as specified. Gaskets shall be supplied by the grooved coupling manufacturer.
3. Grooved end shall be clean and free from indentations, projections and roll marks in the area from pipe end to groove.
4. A factory trained field representative shall provide on-site training to contractor's field personnel in the installation of grooved piping products.
5. The factory trained representative shall periodically review the product installation. Contractor shall remove and replace any improperly installed products.

E. Flanges and Unions:
1. Face true and provide with 1/16 inch thick nonasbestos gasket.
2. Provide in each line immediately preceding connection to each piece of equipment or device requiring maintenance, such as coils, pumps, control valves, and other similar items.
3. Unions and flanges for servicing are not required in installations using grooved mechanical joint

couplings. (The couplings shall serve as unions and disconnect points.)

3.4 INSTALLATION – ACCESSORIES

A. Install specialties in accordance with manufacturer's instructions.

B. Provide one pressure gage per pump, installing taps on suction and discharge of pump. Pipe to gage.

C. Install pressure gages with pulsation dampers. Provide needle valve to isolate each gage.

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 for insulation.

E. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets.

F. Install gages and thermometers in locations where they are easily read from normal operating level.

G. Adjust gages and thermometers to final angle, clean windows and lenses, and calibrate.

H. Locate test plugs where indicated.

I. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity.

J. Pipe relief valve outlet to nearest floor drain.

K. Air Vents:
   1. Manual: Install at all high points and where high pockets exist, except where automatic vents are required.
   2. Automatic: Install where indicated. Isolate air vents from system with gate or ball valves. Do not install above ceilings.

L. Drain Valves:
   1. Gate or ball valve with hose nipple and cap. 3/4-inch unless otherwise indicated.
   2. Provide as indicated and at all low points and pockets in piping. Locate such that piping system can be entirely drained.

M. Provide dielectric unions, waterway fittings, or flanges on all connections between ferrous and nonferrous piping and elsewhere as indicated.

N. Reducers and Adapters:
   1. Provide for connection of different diameter materials.
   2. Provide adjacent to coils, pumps, chillers, and similar equipment when required.
   3. Use concentric type except on suction side of pumps and elsewhere as indicated.
   4. Use eccentric reducer with flat side up on pump suction.

3.5 TESTING

A. Hydrostatically test each system at a pressure of 150 percent of the specified working pressure or 125 psig whichever is greater.

B. Maintain test pressure for a minimum of 2 hours and until all joints are examined for leakage.

C. Piping may be tested in sections at the Contractor's option; how- ever before the system is cleaned, test the entire system as a unit.

D. Repair leaks by rewelding, resoldering or tightening fittings. Install new fitting if required to repair leaks. Caulking or peening of joints is not permitted.

E. Test system for an additional 2 hours after all repairs are completed.

F. Valve off or otherwise isolate any equipment not designed to handle the test pressure.

G. Adjust pressure reducing valves as required.

END OF SECTION 232113

SECTION 23 21 23 – HYDRONIC PUMPS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, and services required for complete installation of all Hydronic Pumps indicated on Drawings and specified herein.

1.3 QUALIFICATIONS

A. Alignment: Base mounted pumps shall be aligned by qualified millwright.

PART 2 — PRODUCTS

2.1 BASE MOUNTED PUMPS:

A. All pumps for this project will be provided by Owner. Contractor installed.

PART 3 — EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide access space around pumps for service. Provide no less than minimum as 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.

D. Provide line sized shut-off valve and pump suction fitting on pump suction, and line sized combination pump discharge valve on pump discharge.

E. Provide drains for bases and seals, piped to and discharging into floor drains.

F. Check, align, and certify alignment of base mounted pumps prior to start-up.

G. Install base mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place.

H. Lubricate pumps before start-up.

END OF SECTION 232123

SECTION 232500 - HVAC WATER TREATMENT

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, and services required for complete installation of all HVAC Water Treatment indicated on Drawings and specified herein.

1.3 SUBMITTALS

A. Shop Drawings: Indicate system schematic, equipment locations, and controls schematics, electrical characteristics and connection requirements.

B. Product Data: Provide chemical treatment materials, chemicals, and equipment.

C. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

1.5 REGULATORY REQUIREMENTS

A. Conform to applicable code for addition of non-potable chemicals to building mechanical systems, and for to public sewage systems.

1.6 MAINTENANCE MATERIALS

A. Provide sufficient chemicals for treatment and testing during warranty period.

PART 2 — PRODUCTS

2.1 SERVICE COMPANY

A. Guardian IPCO.

B. Contact Witten Irwin at (205) 514-5506 for pricing and coordination.

2.2 MATERIALS

A. System Cleaner:
   1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodium tripoly phosphate and sodium molybdate.

2. Biocide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or micro biocides such as quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.

B. Closed System Treatment (Water):
1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
3. Conductivity enhancers; phosphates or phosphonates.

C. Condenser Water System Treatment (Cooling Towers):
1. Sequestering agent to inhibit scaling; phosphonates, sodium polyphosphates, lignin derivatives, synthetic polymer polyelectrolytes, or organite phosphates.
2. Acid to reduce alkalinity and pH; sulphuric acid.
3. Corrosion inhibitor; zinc-phosphate, phosphonate-phosphate, phosphonate-molybdate and phosphonate-silicate, sodium tolyltriazole, or low molecular weight polymers.
4. Biocide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.

2.3 BY-PASS (POT) FEEDER

A. 5.0 gal quick opening cap for working pressure of 175 psig.

2.4 SOLUTION METERING PUMP

A. Reuse existing.

2.5 SOLUTION TANKS

A. Reuse existing.

2.6 LIQUID LEVEL SWITCH

A. Reuse existing.

2.7 CONDUCTIVITY CONTROLLER

A. Reuse existing.

2.8 WATER METER

A. Reuse existing.

2.9 SOLENOID VALVES

A. Reuse existing.

2.10 TIMERS

A. Reuse existing.

PART 3 — EXECUTION

3.1 PREPARATION

A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.

B. All hydronic piping systems shall be chemically cleaned, flushed and refilled following successful pressure testing and before final balancing.

C. Systems shall be pre-flushed and drained prior to chemically cleaning. Provide 2″ fire hose connection of both supply and return lines for initial flushing of the system. Make connection to nearest fire hydrant for adequate flow and pressure for flushing and connect drain to approved disposal point. Bypass all coils and heat exchangers. **Do not flush through coils or heat exchangers.**

3.1 CLEANING SEQUENCE

A. Concentration:
   1. As recommended by manufacturer.
   2. One pound per 100 gallons of water contained in the system.
   3. One pound per 100 gallons of water for hot systems and one pound per 50 gallons of water for cold systems.

B. Hot Water Heating Systems:
   1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
   2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
   3. Circulate for 6 hours at design temperatures, then drain.
   4. Refill with clean water and repeat until system cleaner is removed.

C. 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.

D. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.

E. Flush open systems with clean water for one hour minimum. Drain completely and refill.

F. Remove, clean, and replace strainer screens.

G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.3 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.

3.4 CONDENSER WATER SYSTEMS (COOLING TOWERS)

A. Reconnect and commission the existing automatic condenser water control systems for inhibitor feed, blow down and biocide feeds. Inhibitor application shall be meter activated, blow down shall be conductivity activated, and biocide shall be meter fed with blow down locked out to ensure biocide retention time.

B. Reconnect and commission the existing water meter on system make-up, wired to control system.

C. Reconnect and commission the existing solution pumps to feed sequestering agent and corrosion inhibitor from solution tank into condenser water supply to tower.

D. Reconnect and commission the existing conductivity controller to sample condenser water and operate 3/4 inch solenoid bleed valve and piping to blow down controller sampler wired to open when condensing water pump is operating.

E. Reconnect and commission the existing liquid level switch in each solution tank to de-activate solution pump and agitator, and sound local alarm bell.

END OF SECTION 232500

SECTION 233425 – WALL PROPELLER FANS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, equipment and services required for complete installation of all Wall Propeller Fans indicated on Drawings and specified herein.

1.3 SUBMITTALS

A. General: Submit in accordance with Division 1 Submittal Procedures.

B. Provide dimensional drawings and product data on each fan.

C. Provide fan curves for each fan at the specified operation point, with the flow, static pressure and horsepower clearly plotted.

D. Provide outlet velocity and fan's inlet sound power readings for the eight octave bands, decibels, and sones.

E. Provide manufacturer's certification that exhaust fans are licensed to bear Air Movement and Control Association (AMCA), Certified Rating Seal for sound and air performance.

1.4 QUALITY ASSURANCE

A. Performance ratings: Conform to AMCA standard 211 and 311. Fans must be tested in accordance with ANSI/AMCA Standard 210-99 and AMCA Standard 300-96 in an AMCA accredited laboratory. Fans shall be certified to bear the AMCA label for air performance seal.

B. Each fan shall be given a balancing analysis which is applied to wheels at the outside radius. The maximum allowable static and dynamic imbalance is 0.05 ounces (Balance grade of G6.3).

C. Comply with the National Electrical Manufacturers Association (NEMA), standards for motors and electrical accessories.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly indicating manufacturer, material, products included, and location of installation.

B. Storage: Store materials in a dry area indoor, protected from damage, and in accordance with manufacturer’s instructions. For long term storage follow manufacturer's Installation, Operations, and Maintenance Manual.

C. Handling: Handle and lift fans in accordance with the manufacturer’s instructions. Protect materials and finishes during handling and installation to prevent damage. Follow all safety warnings posted by the manufacturer.

1.6 WARRANTY

A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
   1. The warranty of this equipment is to be free from defects in material and workmanship for a period of one year from the purchase date. Any units or parts which prove defective during the warranty period will be replaced at the Manufacturers option when returned to Manufacturer, transportation prepaid.
   2. Motor Warranty is warranted by the motor manufacturer for a period of one year. Should motors furnished by us prove defective during this period, they should be returned to the nearest authorized motor service station.

1.7 SUBMITTALS AT PROJECT CLOSEOUT

A. Installation, Operation, and Maintenance Manual (IOM): Provide manufacturer's installation, operations, and maintenance manual, including instructions on installation, operations, maintenance, pulley adjustment, receiving, handling, storage, safety information and cleaning. A troubleshooting guide, parts list, warranty and electrical wiring diagrams.

PART 2 — PRODUCTS

2.1 MANUFACTURER

A. Greenheck; AER.

B. Cook.

C. Breidert.

D. Twin City.

2.2 DIRECT DRIVE SIDEWALL MOUNTED PROPELLER FANS

A. General Description:
   1. Fan arrangement shall be exhaust.
   2. Maximum continuous operating temperature 130° Fahrenheit.
   3. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel:
   1. Propeller constructed of cast aluminum tapered airfoil blades and cast aluminum hubs.
   2. Securely attached to motor shaft with a standard square key, set screw and tapered bushing.
   3. Statically and dynamically balanced in accordance with AMCA Standard 204-05.
   4. The propeller and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency.

C. Motors:
   1. Motor enclosures: Open drip-proof; ECM.
   2. Motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.
   3. Accessible for maintenance.

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D. Drive Frame:
   1. Frames and Panels shall be bolted construction.
   2. Drive frame assemblies and fan panels shall be galvanized steel or painted steel.

3. Drive frame shall be formed steel and fan panels shall have pre-punched mounting holes, formed flanges, and a deep formed inserted venturi.

E. Disconnect Switches:
1. NEMA rated: 1.
2. Positive electrical shut-off.
3. Wired from fan motor to junction box.

F. Options/Accessories:
1. Dampers:
a) Type: Motorized.
b) Balanced for minimal resistance to flow.
c) Galvanized frames with prepunched mounting holes.
2. Dampers Guards:
a) Guard material: Galvanized.
b) Shall completely enclose the damper or wall opening on the discharge side of the fan.
3. Motor Side Guard:
a) Guard type: OSHA Guard.
b) Protective guard completely enclose the motor and drive side of the fan.

PART 3 — EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions.

3.2 EXAMINATION

A. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with installation until unsatisfactory conditions are corrected.

3.3 PREPARATION

A. Ensure wall openings are square, accurately aligned, correctly located, and in tolerance.

3.4 INSTALLATION

A. Install fans system as indicated on the Installation, Operation and Maintenance Manual (IOM) and contract drawings.

B. Install fans in accordance with manufacturer's instructions.

3.5 SYSTEM STARTUP

A. Refer to Installation, Operation, and Maintenance Manual (IOM).

3.6 ADJUSTING

A. Adjust exhaust fans to function properly.

B. Lubricate bearings.

C. Adjust drive for final system balancing.

D. Check wheel overlap.

3.7 CLEANING

A. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction

3.8 PROTECTION

A. Protect installed product and finished surfaces from damage during construction.

B. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

END OF SECTION 233425

SECTION 236430 – CENTRIFUGAL WATER CHILLERS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, and services required for complete installation of all Centrifugal Water Chillers indicated on Drawings and specified herein.

1.3 SECTION INCLUDES

A. Semi-hermetic, direct drive, multi-stage, water-cooled centrifugal chiller with single compressor.

1.4 DELIVERY AND HANDLING

A. Comply with manufacturer's installation instructions for rigging, chiller loading, local transportation requirements, unloading, storage, and final setting.

B. Protect chiller and controls from physical damage. Leave factory shipping covers in place until installation. The entire unit must be shrink wrapped with an environmentally recyclable material standard. The material shall include an imbedded desiccant to minimize/eliminate internal moisture.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS

A. Chiller will be furnished by Owner. Contractor installed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide for connection to electrical service. Pads to be provided by chiller manufacturer.

C. Provide elastomeric isolation pads to reduce vibration transmission.

D. Arrange piping for easy dismantling to permit tube cleaning.

E. Align chiller on concrete foundations, sole plates, and sub-bases. Level, grout, and bolt in place.

F. Furnish and install a flow switch with timer or equivalent device in both the chilled water and condenser water piping property interlocked to insure that the unit can operate only when waterflow is established.

G. Furnish and install drain valves to each water box.

H. Install vent cocks on each water box.

I. Furnish and install strainers upstream of chiller condenser bundles to protect tubes from potential damage caused by debris in the circulating water.

J. Furnish sufficient refrigerant of 25 lb. per machine and dry nitrogen of 50.0 lb. per machine for pressure testing under manufacturer's supervision.

K. Water connection piping must not transfer forces to the chiller. Because of cumulative tolerances in manufacture and field installation, pre-piping to water connections closer than 36″ is not recommended. Any problems associated with pre-piping of water connections closer than 36″ to the chiller are the responsibility of the installing contractor.

L. Furnish and install vent lines for evaporator and condenser relief devices venting to atmosphere per ASHRAE 15 and unit installation manual.

M. Provide evaporator connections to chilled water piping. Refer to Section 232113.
   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 connecter.
      f) Pressure gage.
      g) Shut-off valve.
   2. On outlet, provide:
      a) Thermometer well and thermometer.
      b) Flexible pipe connecter.
      c) Pressure gage.
      d) Shut-off valve.

N. Provide condenser connection to condenser water piping. Refer to Section 232113.
   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 connecter.
      f) Pressure gage.
      g) Shut-off valve.
   2. On outlet, provide:
      a) Thermometer well and thermometer.
      b) Flexible pipe connecter.
      c) Pressure gage.
      d) Shut-off valve.

3.2 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate system operation and verify specified performance.

END OF SECTION 236430

SECTION 236513 – INDUCED DRAFT COOLING TOWERS

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Provide all labor, materials, and services required for complete installation of all Induced Draft Cooling Towers indicated on Drawings and specified herein.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Cooling tower will be furnished by Owner. Contractor installed.

PART 3 — EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Connect condenser water piping to tower. Pitch condenser water supply to tower and condenser water suction away from tower.

C. Connect make-up water piping with flanged or grooved connections to tower.

D. Connect overflow, bleed, and drain as indicated on drawings.

E. Mount on structural steel frame as indicated on drawings.

3.2 MANUFACTURER'S FIELD SERVICES

A. Inspect tower after installation and submit report prior to start-up, verifying installation is in accordance with specifications and manufacturer's recommendations.

B. Start-up tower in presence of factory authorized service technician and instruct Owners operating personnel.

END OF SECTION 236513

DIVISION 26

ELECTRICAL

SECTION 26 00 00 — ELECTRICAL

PART 1 — GENERAL

1.1 Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.2 Description of Work:

A. This section of the specifications is coordinated with and complimentary to certain sections of the General Specifications. Specifically, the Contractor shall refer to "Instructions", "General Conditions", "Special Conditions", and all other relevant divisions of work. Applicable provisions of the General Conditions shall govern work under this heading as if written in full herein.

B. The Electrical Specifications shall be considered to be all inclusive in their individual divisions of work and shall refer to and be a part of all applicable parts of the General Specifications whether bound with these Specifications or whether handled as a separate document.

C. These Specifications are intended to provide for a complete electrical system. Any item(s) indicated on the Drawings and not specified or vice-versa, or any detail omitted which is necessary for the proper installation of the system, shall be supplied and installed by the Contractor without additional cost.

D. The Drawings and Specifications shall be considered complimentary one to the other so that materials or labor indicated, called for or implied by one and not the other shall be supplied as though called for by both.

E. The Electrical Contractor shall keep clean plans on the job and mark all changes (changes by addenda, change orders, re-routing of conduits or circuits to meet field conditions, etc.) made in the field. These changes shall be marked on the plans when they are made and not when the job is finished. This set of plans shall be turned over to the Architect or the Engineer through the General Contractor to be included in as-built plans.

1.3 Scope, Work Included:

A. The Electrical Contractor shall purchase and furnish all materials, wire, fixtures and equipment shown on the Electrical Drawings and covered by this section of the Specifications. The General Contractor or another subcontractor shall not be used to purchase materials with the intent to circumvent bid laws or to overcome poor credit on the part of the Electrical Contractor.

B. The Contractor shall:

1. Install empty conduit for thermostat and control circuits as shown on mechanical or electrical drawings and/or specified under Division 23 of the Specifications.
2. Install all power wiring and make electrical connections to heating, air conditioning, ventilation and other electric consuming equipment that is furnished and installed by other trades. Proper starter(s) and interior controls, including control wiring, shall be furnished with equipment with all wiring brought out to terminal block or junction box.

1.4 Work By Others:

A. All patching and finishing, painting of conduits, equipment and panel trim.
B. All furring for spaces in which conduit and other electrical work may be installed.
C. All heating, air conditioning, ventilation and other electric consuming equipment covered by other sections of the Specifications and associated control wiring.

1.5 Codes, Laws and Ordinances:

A. All material and workmanship shall comply with National Electrical Code (2017), state laws, local ordinances.
B. In cases of differences between building codes, state laws, local ordinances and utility regulations and the Contract Document, the most stringent shall govern. The Contractor shall promptly notify the Engineer and/or Architect in writing of any such difference. Should the Contractor perform any work that does not comply with such requirements, he shall bear all costs arising in correcting the deficiencies.

1.6 Experience of Bidders:

A. Electrical contracting shall be the primary business of bidders under this section of the Specifications, and the bidder shall have installed at least three (3) similar type and size projects.
B. The bidder shall submit proof of similar projects when requested by the Architect or Engineer. Proof shall include all of the following:
    1. Name of project
    2. Date of completion
    3. General description of electrical work
    4. Approximate dollar value of electrical installation
    5. Name of electrical design and inspecting engineer.
C. The bidder shall have an active license by the Alabama Electrical Contractors Board as an Electrical Contractor and shall submit proof of license when requested. A local business permit or local electrical contracting license will not be considered sufficient. The required Alabama license shall not have “provisional” limitations and any such limitations will cause the licensee to be rejected from the project.
D. Regardless of the bidding amount, the Electrical Contractor shall be actively licensed by the State of Alabama as a General Contractor with specialty in Electrical. An Electrical Contractor who is licensed only as a sub-contractor type “S” license is limited to bidding through a licensed Prime General Contractor.
E. The bidder shall have practiced electrical contracting under his current business name for a minimum of three (3) consecutive years.
F. The Electrical Contractor shall provide substantiating proof of these requirements a minimum of 5 days prior to bid date to the Electrical Engineer. If substantiating proof is not submitted and approved, the Electrical Contractor will not be allowed to bid or perform work on the project.
G. When pre-qualification of electrical sub-contractors are required prior to bidding, each potential sub-contractor shall enclose in his pre-qualification documents the Company's latest audited financial statement or a current letter of reference from his bank or primary lending institution indicating good financial standing.
H. The Engineer reserves the right to dismiss any contractor that he feels does not have sufficient experience or whose quality of work would not be in the best interest of the Owner.

1.7 Responsibility of Bidders:

A. Before submitting proposal, each Bidder shall examine all Drawings and Specifications, equipment space allocated, and site of work to determine character of work. No consideration will be given at a later date to alleged misunderstanding as to requirements of work, materials to be furnished, or conditions required by nature of site.

B. Items obviously omitted from Specifications and/or Drawings by oversight or error shall be called to the attention of the Engineer and/or Architect before submitting bids. After award of Contract, any changes in materials, fixtures, equipment, etc., or any rearrangement necessary to complete Contract, shall be at the expense of the Contractor.

C. This Contractor shall pay additional cost that may be incurred by other trades due to the installation of equipment or material, covered by this section of Specifications and Electrical Drawings, which differ from that specified even though such equipment or materials has been approved by the Architect and/or Engineer.

1.8 Fees and Permits:

A. This Contractor shall secure all licenses and permits, and pay all fees required for completion of work under this section of the Specifications.

B. This Contractor shall be licensed by the State of Alabama as an Electrical Contractor. A simple business license from the local municipality is not sufficient.

1.9 Supervision:

A. This Contractor shall be held strictly responsible for the proper installation of the complete electrical system. He shall keep a competent superintendent or foreman on the job site throughout the progress of the Work. The foreman shall not be removed or replaced from the project except by written approval from the Engineer.

B. The foreman shall, as a minimum, have 5 years of experience in similar type commercial projects and shall hold a 10-hour OSHA card for safety training. A minimum of 50% of the electrical laborers on the construction site shall each hold a 10-hour OSHA card for safety training.

1.10 Changes and Additional Work: No changes shall be made from the work as called for by these Specifications and Drawings, except on written order of the Architect. No charge for extra work will be allowed unless such extra work has been duly authorized by a written order of the Architect stating the change to be made.

1.11 Warranty:

A. In addition to the customary manufacturer's guarantee on materials, this Contractor shall guarantee all materials and equipment furnished by him and all workmanship incidental to the Electrical Contract for a period of one (1) year following the date of final inspection and approval. Any defective material or workmanship which becomes apparent during the one-year period shall be replaced by him without additional cost to the Owner.

1.12 Emergency Repairs: The Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding the Contractor's guarantee bond nor relieving the Contractor of his responsibility during the warranty period.

1.13 Submittal Data:

A. The Contractor shall prepare data for submitting to the Engineer based upon all equipment, panels, motors, etc., he proposes to furnish as specified and shown on the Drawings. Partial submittal will not be accepted.
B. Within twenty (20) days after award of the Contract, the Contractor shall submit THROUGH THE GENERAL CONTRACTOR, a minimum of six (6) sets of all engineering data pertaining to all equipment, materials, etc., he proposes to furnish for this project.
C. The Submittal Data shall include the following:
    1. On the exterior of the folder, the Contractor's name, address, telephone number and the job name.
    2. On the first page, a copy of the letter of transmittal from the Contractor to the Engineer listing each item of material and equipment contained therein (in the order they appear in the Specifications) the make, vendor, where used and number sets being transmitted.
D. The data shall include the following: Operational Data, Shop Drawings, Dimension Drawings of Equipment and Structures, Fixture Data, Voltage, Speed and Catalog Engineering Data Sheets, Rough-In Drawings, and any other data required to verify compliance with the Specifications.
E. Each item shall be clearly marked to indicate its use and to show any deviation from the Specifications.
F. Submittals shall include at least the following items:
    1. Disconnect Switches

1.14 Standard of Materials and Workmanship:
A. All materials, equipment and apparatus covered by this Specification shall be new, of current manufacture and shall bear the seal of approval of the Underwriters' Laboratories, Incorporated, (UL) wherever standards have been established by that agency. Where UL standards do not exist, consideration will be given to certified test reports of an adequately equipped, recognized independent testing laboratory qualified to perform such testing. Defective equipment and/or equipment damaged during installation or testing shall be replaced or repaired in a manner meeting with approval of the Engineer.
B. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance when completed. Work shall be installed in accordance with NECA 1-2006, Standard for Good Workmanship in Electrical Contracting.

1.15 Inspections: All work shall be completely installed and tested as required by this section of the Specifications and by all codes and ordinances before inspection is requested. All tests shall be repeated to the satisfaction of those making the inspection. All work shall be subject to inspection by the Architect, Engineer or their representative at all times.

1.16 Coordination:
A. This Contractor shall coordinate his work with other trades, installing the system and equipment furnished by him in such a manner as to avoid interferences. All changes required in the work of the Contractor caused by his neglect to do so shall be made by him at his own expense.
B. Discrepancies between scale and dimensions or between architectural, structural, mechanical and/or electrical drawings shall be called to the Architect's attention immediately.

1.17 Grounding:

A. Grounding system shall meet all requirements of Article 250 of the National Electric Code and shall meet additional requirements as specified herein and on the Drawings.

PART 2 — PRODUCTS

2.1 Distribution Centers & Panelboards:

A. Provide new breakers or fuses for existing panelboards and switchboards as indicated. New breakers shall match the brand and model of the panel intended.

B. Provide inside cabinet door of each panel a framed (typed) directory listing all circuits as connected to panel. Where a door is not provided on distribution panels, engraved micarta nameplates shall be located adjacent to breakers and firmly attached using screws.

C. Where existing panelboards are modified by the addition or removal of circuits, the directory card shall be re-typed to indicate any changes. Where new breakers are provided for existing panels, all bus connectors needed for an operational system shall be provided.

D. Interrupting ratings shall be coordinated with the available short circuit current. Series rating is unacceptable.

E. Branch circuit protection devices shall be molded case circuit breakers bolt-on type. Multi-pole breakers shall be designed such that an overload in any phase will trip all poles simultaneously.

2.2 Conduit and Fittings:

A. Conduit in concrete or corrosive areas shall be plastic conduit equal to Carlon Type 40, PVC conduit shall meet and be installed in accordance with all requirements of Article 347 of the NEC. A ground wire must be installed in each conduit and proper connections made at panels, receptacles, switches, lights, etc., to make a continuous grounding system. Where any circuit in non-metallic conduit extends above ground, a fitting shall be installed to convert to metallic conduit.

B. Conduit exposed to weather or in wet locations shall be rigid galvanized metal. PVC conduit shall not be used above ground.

C. Where conduit enters or exits the top of an exterior enclosure, a Myers type weatherproof hub shall be used.

D. Conduit from a junction box to motors, etc., inside the buildings shall be liquid-tight flexible metal as provided for in Article 351 of NEC.

E. Conduit from a junction box or local disconnect switch to AC unit, etc., outside the buildings shall be Liquid-Tight Flexible Metal as provided for in Article 351 of NEC.

F. All other conduit shall be galvanized or sherodized electrical metal tubing (thin wall).

G. Conduit sizes shall be as indicated; where not indicated, sizes shall meet NEC requirements for number of conductors to be accommodated. Do not install conduit smaller than 1/2".

H. Electrical Metallic Tubing shall be hot-dipped galvanized and manufactured in accordance with UL Standard #797 and installed according to Article 348 of the NEC.

I. All metallic fittings shall be constructed of steel. Cast fittings will be rejected.

2.3 Conductors:

A. All conductors shall be copper of not less than 98% conductivity and sized based on Drawings. Conductors sized #6 and smaller shall be Type THHN or THWN. Conductors sized #4 and larger shall be Type RHW/USE, RHW-2 or XHHW. Aluminum conductors shall not be used.
B. Conductors #8 and larger shall be stranded. Conductors #10 and smaller shall be solid.
C. No conductor smaller than #12 will be allowed for branch circuits. Reduced size conductor tapping is prohibited.
D. All equipment grounding (ground) conductors shall be bare or have green covering.
E. Wiring shall be color coded as follows:
    1. 208 wye/120 volt, 3 phase, 4 wire solid neutral:
        a) Phase A Black
        b) Phase B Red
        c) Phase C Blue
        d) Neutral White
        e) Ground Green
    2. 480Y/277 volt, 3 phase, 4 wire solid neutral:
        a) Phase A Brown
        b) Phase B Orange
        c) Phase C Yellow
        d) Neutral Gray
        e) Ground Green
F. Phase conductors #10 and smaller shall have colored insulation. Phase conductors sized #8 and larger may have colored insulation or may have colored electrical tape wrapped on the outside of black insulation at every termination point. In no case shall colored tape be used to change the color coding of colored insulation.
G. Grounded conductors (neutrals) sized #6 and smaller shall have white or gray insulation per the voltage system as listed above and in accordance with N.E.C. section 200.6. Colored tape is not acceptable on neutral conductors sized #6 and smaller. Neutral conductors sized larger than #6 may have colored insulation or may have colored electrical tape wrapped on the outside of black insulation at every termination point.
H. The wiring system shall be color coded as required by the Specification in each junction box, pull box, outlet box, safety switch, panel, etc., and at each termination or splice.
I. Where a building has more than one voltage characteristic (such as 480/227 volt AND 208/120 volt), a legend of wire color code shall be posted at every panelboard.
J. Adhesive cable tie mounts and plastic cable ties shall be used for wire management inside panelboards.

2.4 Pull or Junction Boxes:
A. Provide pull or junction boxes where indicated and where directed to facilitate the pulling of conductors.
B. For concealed conduit, make boxes flush with wall.
C. Make box covers accessible and easily removable.
D. Boxes shall have no opening except those through which conduit pass.
E. Where possible, use standard size junction boxes, conforming to NEC requirements.
F. For special size junction boxes, fabricate of galvanized steel as indicated.

2.5 Safety Switches:

A. Safety switches shall be Type "HD" (heavy duty) unless noted otherwise, fused or non-fusible as indicated with number of poles as shown or required. Safety switches for equipment may be non-fused only if equipment is UL tested with circuit breaker protection.
B. Switches shall be rated 600 volts as required.
C. Switch enclosures shall be of the NEMA configuration required (i.e. NEMA 1 for general purpose, NEMA 3R for raintight, etc., as required or shown).
D. Disconnect switches shall be provided for all motors and equipment indicated or required by the National Electric Code.

2.6 Motors, Controls, and Control Wiring:

A. All motors shall be furnished and installed under Division 23, MECHANICAL, but shall be electrically connected for correct rotation under this section.
B. Controllers shall be furnished under Division 23, MECHANICAL, unless noted otherwise herein or on the Drawings, but shall be mounted and electrically connected for correct operation under this section (except starters which are included as an integral part of the specific equipment).
C. All control wiring shall be furnished and installed under Division 23, MECHANICAL, unless noted otherwise herein or on the Drawings.
D. Provide empty conduit from thermostats to mechanical units. Provide outlet box for thermostat mounting. Coordinate with mechanical for locations.

PART 3 — EXECUTION

3.1 Grounding:

A. Grounding system shall meet all requirements of Article 250 of the National Electrical Code. In general, a ground wire shall be installed in every conduit. The conduit installation itself shall serve as an additional grounding means.
B. All grounding conductors shall be copper. Sizes No. 10 AWG and smaller shall be provided with a green colored insulation. Sizes No. 8 AWG and larger shall be marked with green tape. Grounding conductors shall be marked at each pull box, enclosure, starter, disconnect switch, panelboard, etc.
C. Provide grounding for entire electric installation as indicated and specified herein. Following are included as requiring grounding:
    1. Conduits and other conductor enclosures.
    2. Neutral or identified conductor of interior wiring system at each service and at each separately derived system.
    3. Lighting panel boards, control centers, etc.
    4. Non-current-carrying metal parts of fixed equipment such as motors and lighting fixtures.
    5. Grounding screw for every receptacle and switch.
D. The required grounding conductor shall be installed in the common conduit with the related phase and neutral conductors. Where there are parallel feeders installed in more than one raceway, each raceway shall have a ground conductor.
E. Where metallic conduits terminate without mechanical connection (i.e. locknuts and bushings) to service entrance equipment and for all sizes of metallic conduit (rigid or flexible) terminating in concentric or eccentric knockouts, the following procedure shall be followed: Each conduit shall be provided with an insulating ground bushing

and each bushing connected with a bare copper conductor to the ground bus in the electrical equipment. The ground conductor shall be in accordance with the article on Grounding of NEC.

3.2 Interior Wiring:

A. General:

1. Interior wiring shall include electrical conduits, conductors, wiring devices, supports, other materials and their installation, required to distribute electric current from distribution centers for all purposes, as indicated and specified.
2. Conduit runs as indicated are diagrammatic; exact routing of conduit shall suit job conditions. Where conduits are exposed, they shall be installed in a neat manner.
3. Roughing-in dimensions of electrically-operated units will be furnished by trades supplying the same. Set conduit boxes for connecting to units only after receiving approved dimensions and after checking locations with Contractors.
4. All wiring shall be protected from painting. Any wiring where the color coding is unreadable due to paint shall be cleaned before final inspection
5. All wiring shall be tested with Meggar-type equipment before final inspection. Testing shall consist of applying 1000 volts across each conductor to check for short circuits and torn insulation.
6. Junction boxes shall be solidly fastened to the building structure. Boxes shall not be solely supported by conduit.
7. Low voltage cabling that is routed above the ceiling and not within conduit shall be properly supported so that it does not lay on a ceiling grid or ceiling tiles.

B. Interior Conduit Installation:

1. Extend conduits from distribution center through pull and junction boxes, panelboards to outlet boxes; bond throughout to make each circuit continuous from service to outlet.
2. Install conduits in wall, above ceilings, or under floors as shown.
3. Locate conduits in partitions accurately so as to conceal them completely; do not expose conduit bends at floor.
4. Install conduit in walls and partitions as nearly vertical as possible; horizontally only where unavoidable; never diagonally.
5. Make field bends and offsets uniform and symmetrical, without flattening conduit or scarring conduit finish; of minimum radius not less than six (6) times the diameter of the conduit.
6. Where plastic (PVC) conduit is used, all field bends must be made with Hotbox type bends. A torch shall not be used to heat conduit for bending.
7. Install conduit with minimum number of joints; join with approved couplings and fittings; make joints butted.
8. Cut conduit with hacksaw or approved pipe cutter using cutting knives; ream ends to remove burrs and sharp edges.
9. In damp locations, install conduit, fittings, boxes of type and manner to prevent moisture from entering conduit system.
10. Cap or plug conduit ends during construction; cap or plug ends of conduit that are to remain empty after test; make watertight.
11. Locate conduits at least 6" from steam pipes, hot water pipes, or other hot surfaces.

12. Support each conduit within 36 inches of junction and outlet boxes. Fastening of unbroken lengths of EMT shall be permitted to increase to 60 inches where structural members do not readily permit fastening within 36 inches.
13. All empty conduits shall have a nylon pull cord.
14. Where raceways contain 4 AWG or larger conductors, insulated fittings shall be used at every cabinet, box, or enclosure in accordance with NEC 300.4(G) requirements.
15. Flexible conduit shall be properly supported.

3.3 Identification:

A. Equipment identification shall be made using engraved laminated phenolic or Micarta plates (indented tape labels will not be permitted). Characters shall be white on a black background and 1/4" high minimum. Plates shall be secured to the panels by means of screws or metal pressure pins. Cement, by itself, will not be acceptable. All nameplates shall be mounted on the outside surface of the piece of equipment.

B. Service entrance panels and distribution panels without doors shall also have each circuit identified as to circuit number, load, and electrical characteristics of loads. For example, a 5 Ton, 208 volt, 3 phase condensing unit number 3 would be labeled as follows with the plate attached adjacent to the circuit:

CU-3
5 Ton, 208V, 3 PH

C. Each junction box cover shall be labeled with a permanent "magic" marker or other means to identify the circuits within. For example, a junction box containing lighting circuits 21, 23, 25 from panel "L2A" would be labeled "L2A-21, 23, 25".
D. All conductors shall be color coded as identified in Paragraph "Conductors". Branch circuit conductors in lighting and appliance panels shall be marked with circuit number.

3.4 Fireproofing: All conduit and boxes passing through or installed within fire walls and smoke walls shall be installed so as to maintain the integrity of the wall through which it passes. Fire barrier penetrations shall be made in accordance with a UL listed assembly. Boxes shall be installed within 1/4" of wall surface. Metallic conduit sleeves shall be provided for every cable penetration through a fire rated barrier.

3.5 Clean-up: When the job is complete in every detail and building is ready for occupancy, the Contractor shall make a careful examination of all areas and see that all are in first class condition, all equipment working properly, and that all equipment and fixtures are properly cleaned, leaving all apparatus in first class condition. He shall remove all boxes, trash, etc., pertaining to his contract from the job site.

END OF SECTION 26 00 00