

INFORMAL CONTRACT
SCO# 21-24124-01A

FOR

FIELDHOUSE BOILER REPLACEMENT

**WESTERN CAROLINA UNIVERSITY
CULLOWHEE, NORTH CAROLINA**

SUD ASSOCIATES, P.A.
CONSULTING ENGINEERS
DURHAM, NORTH CAROLINA

MAY 4, 2022

BID SET _____

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TABLE OF CONTENTS

TITLE PAGE

TABLE OF CONTENTS

ADVERTISEMENT FOR BIDS

INFORMAL CONTRACT

BID/ACCEPTANCE FORM

GENERAL CONDITIONS OF THE CONTRACT

SUPPLEMENTARY GENERAL CONDITIONS

IDENTIFICATION OF HUB CERTIFIED MINORITY BUSINESS PARTICIPATION

MBE AFFIDAVIT FORMS (submit with proposal)

GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY
BUSINESSES FOR PARTICIPATION IN STATE CONSTRUCTION CONTRACTS

APPENDIX E MBE DOCUMENTATION FOR CONTRACT PAYMENTS

STATE OF NORTH CAROLINA SALES AND USE TAX REPORT FORM

CHANGE ORDER FOR INFORMAL PROJECTS

GENERAL

01010 - SUMMARY OF WORK
01040 - PROJECT COORDINATION
01045 - CUTTING AND PATCHING
01090 - DEFINITIONS AND STANDARDS
01631 - PRODUCTS AND SUBSTITUTIONS

PLUMBING

220110 - PLUMBING GENERAL REQUIREMENTS
220700 - PLUMBING INSULATION
221116 - DOMESTIC WATER PIPING
221119 - DOMESTIC WATER PIPING SPECIALTIES
223300 – ELECTRIC WATER HEATERS

MECHANICAL

230510 – BASIC MECHANICAL REQUIREMENTS
230532 – GENERAL DUTY VALVES FOR HVAC PIPING

230529 – SUPPORTS, ANCHORS, AND VIBRATION ISOLATION
230590 – MECHANICAL PAINTING AND IDENTIFICATION
230700 – MECHANICAL INSULATION
232160 – PIPES AND PIPE FITTINGS
235318 – BOILER BURNERS
238268 – CAST IRON BOILER
238275 - BREECHINGS

ELECTRICAL

260050 - ELECTRICAL GENERAL REQUIREMENTS
260075 - ELECTRICAL IDENTIFICATION
260120 - CONDUCTORS AND CABLES
260130 - RACEWAYS AND BOXES
260500 - COMMON WORK RESULTS FOR ELECTRICAL
260510 - GROUNDING AND BONDING

ADVERTISEMENT FOR BIDS

Western Carolina University
Fieldhouse Boiler Replacement

SCO ID No.: 21-24124-01A

Sealed proposals will be received until 1:00PM on May 26, 2022, in the office of

**Western Carolina University
Facilities Management Department
3476 Old Cullowhee Road
Cullowhee, North Carolina 28723
Attn: Don Hair, Project Manager**

for the construction of the **Fieldhouse Boiler Replacement** and immediately thereafter publicly opened and read in the Conference Room of the Facilities Management Building.

Bids will be received for a **Single Prime Contract**. All proposals shall be lump sum.

Any addendum or approvals will be made available to the public in writing no later than seven (7) days prior to bid date.

Complete plans and specifications for this project can be obtained from:

SUD ASSOCIATES, CONSULTING ENGINEERS, P.A.
90 Southside Avenue Suite 350
Asheville, NC 28801
tel. (828) 255-4691
ihay@sudassociates.com

during normal office hours after May 4, 2022. Electronic documents are provided at no cost. Plan deposit of **One Hundred dollars (\$100.00)** in cash or certified check is required for hardcopy sets.

A prebid conference will be held at the site on Tuesday May 17, 2022 at 1:00PM.

The state reserves the unqualified right to reject any and all proposals.

Signed:

The State of North Carolina through Western Carolina University (Owner)

STATE OF NORTH CAROLINA STANDARD FORM OF INFORMAL CONTRACT AND GENERAL CONDITIONS

FOR

Western Carolina University
Fieldhouse Boiler Replacement
Cullowhee, NC
SCO ID# 21-24124-01A

SCOPE OF WORK

Jordan-Phillips Fieldhouse is served by an oil-fired steam boiler. The boiler provides heat to steam coils in four air handling units as well as domestic hot water via a steam-to-water heat exchanger. The scope of this project is to remove this boiler, heat exchanger, and domestic hot water tank and install a new natural gas-fired steam boiler and accessories, flue liner, piping, and electric water heater. The boiler has been pre-purchased by the Owner and will be furnished to the contractor for installation. The project includes the mechanical, plumbing, and electrical work for a complete and operational system.

NOTICE TO BIDDERS

Sealed bid for this work will be received by:

Don Hair
WCU Facilities Management
3476 Old Cullowhee Road
Cullowhee, NC 28723
(828) 227-7442(p) (828) 227-7198 (f)

up to **1:00 PM**, on **May 26, 2022** and immediately thereafter publicly opened and read aloud. Complete plans and specification and contract documents can be obtained from

Sud Associates, P.A.
90 Southside Avenue, Suite 350
Asheville, NC 28801
(828) 255-4691
sudwest@sudassociates.com

Contractors are hereby notified that they must have proper license under the State laws governing their respective trades and that North Carolina General Statute 87 will be observed in receiving and awarding contracts.

No bid may be withdrawn after the opening of bids for a period of 30 days. The Owner reserves the right to reject any or all bids and waive informalities. Bids shall be made only on the BID/ACCEPTANCE form provided herein with all blank spaces for bids properly filled in and all signatures properly executed. Bids **will not** be accepted electronically, via FAX or email.

Please note on the envelope:

Bid Proposal

Attn: Mr. *Don Hair*

Western Carolina University
Fieldhouse Boiler Replacement
Bid Date: _____, 2022

Contractor Name: License Number

A prebid conference will be held at the site on May 17, 2022 at 1:00PM.

BID/ACCEPTANCE FORM

for

Fieldhouse Boiler Replacement
Western Carolina University
SCO ID# 21-24124-01A

Jordan-Phillips Fieldhouse is served by an oil-fired steam boiler. The boiler provides heat to steam coils in four air handling units as well as domestic hot water via a steam-to-water heat exchanger. The scope of this project is to remove this boiler, heat exchanger, and domestic hot water tank and install a new natural gas-fired steam boiler and accessories, flue liner, piping, and electric water heater. The boiler has been pre-purchased by the Owner and will be furnished to the contractor for installation. The project includes the mechanical, plumbing, and electrical work for a complete and operational system.

We are in receipt of Addendum _____1 _____2 _____3 _____4

The undersigned, as bidder, proposes and agrees if this bid is accepted to contract with the *State of North Carolina* through the Western Carolina University *Facilities Management* for the furnishing of all materials, equipment, and labor necessary to complete the construction of the work described in these documents in full and complete accordance with plans, specifications, and contract documents, and to the full and entire satisfaction of the *State of North Carolina* and the WCU Facilities Management Department and Sud Associates, P.A.

for the sum of:

BASE BID: _____ **Dollars \$** _____

Entirety of Project is required to be completed by __, 2022.

Respectively submitted this ___ day of __ 2022

(Contractor's Name)

Federal ID#: _____

By: _____

Witness: _____

Title: _____
(Owner, partner, corp. Pres. Or Vice President)

(Proprietorship or Partnership)

Address: _____

Attest: (corporation)

Email Address: _____

(Corporate Seal)

By: _____ License #: _____

Title: _____
(Corporation, Secretary/Ass't Secretary.)

ACCEPTED by the STATE OF NORTH CAROLINA

Through

Western Carolina University, Facilities Management Department

Total amount of accepted by the owner, included base bid and bid alternates: _____

BY: _____ TITLE: _____

Date: _____

GENERAL CONDITIONS

1. GENERAL

It is understood and agreed that by submitting a bid that the Contractor has examined these contract documents, drawings and specifications and has visited the site of the Work and has satisfied himself relative to the Work to be performed.

2. DEFINITIONS

Owner: "Owner" shall mean, The State of North Carolina through Western Carolina University

Contractor: "Contractor" shall mean the entity that will provide the services for the Owner.

Designer: The **designer(s)** are those referred to within this contract, or their authorized representatives. The Designer(s), as referred to herein, shall mean architect and/or engineer responsible for preparing the project plans and specifications. They will be referred to hereinafter as if each were of the singular number, masculine gender.

Contract Documents: "Contract Documents" shall consist of the Notice to Bidders; General Conditions of the Contract; special conditions if applicable; Supplementary General Conditions; the drawing and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the bid; the contract; the performance bond if applicable; and insurance certificates. All of these items together form the contract.

INTENT AND EXECUTION OF DOCUMENTS

The drawings and specifications are complementary, one to the other. That which is shown on the drawings or called for in the specifications shall be as binding as if it were both called for and shown. The intent of the drawings and specifications is to establish the scope of all labor, materials, transportation, equipment, and any and all other things necessary to provide a complete job. In case of discrepancy or disagreement in the Contract Documents, the order of precedence shall be: Form of Contract, specifications, large-scale detail drawings, small-scale drawings.

In such cases where the nature of the work requires clarification by the Designer/ Owner, the Designer/ Owner shall furnish such clarification. Clarifications and drawings shall be consistent with the intent of the Contract Documents and shall become a part thereof.

4. AS-BUILT MARKED-UP CONSTRUCTION DOCUMENTS

Contractor shall provide one complete set of legible "as-built" marked-up construction drawings and specifications recording any and all changes made to the original design during the course of construction. In the event no changes occurred, submit construction drawings and specifications set with notation "No Changes." The Designer/Owner must receive "As-built" marked-up construction drawings and specifications before the final pay request can be processed.

5. SUBMITTAL DATA

The Contractor awarded the contract shall submit all specified submittals to the Owner/Designer. A minimum number of copies as specified by the owner, of all required submittal data pertaining to construction, performance and general dimensional criteria of the components listed in the technical specifications shall be submitted. No material or equipment shall be ordered or installed prior to written approval of the submittals by the Designer/Owner. Failure to provide submittal data for review on equipment listed in the technical specifications will result in removal of equipment by the Contractor at his expense if the equipment is not in compliance with the specifications.

6. SUBSTITUTIONS

In accordance with the provisions of G.S. 133-3, material, product, or equipment substitutions proposed by the bidders to those specified herein can only be considered during the bidding phase until five (5) days prior to the receipt of bids or by the date specified in the pre bid conference, when submitted to the Designer with sufficient data to confirm material, product, or equipment equality. Proposed substitutions submitted after this time will be considered only as potential change order.

Submittals for proposed substitutions shall include the following information: _

- a. Name, address, and telephone number of manufacturer and supplier as appropriate. _
- b. Trade name, model or catalog designation.
- c. Product data including performance and test data, reference standards, and technical descriptions of material, product, or equipment. Include color samples and samples of available finishes as appropriate.
- d. Detailed comparison with specified products including performance capabilities, warranties, and test results.
- e. Other pertinent data including data requested by the Designer to confirm product equality.

If a proposed material, product, or equipment substitution is deemed equal by the Designer to those specified, all bidders of record will be notified by Addendum.

7. WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

The contractor shall maintain, in readable condition at his job site one complete set of working drawings and specifications for his work including all shop drawings. Such drawings and specifications shall be available for use by the owner, designer or his authorized representative.

The contractor shall maintain at the job site, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on project drawings by the contractor and submitted to the designer upon project completion and no later than 30 days after acceptance of the project.

8. MATERIALS, EQUIPMENT, EMPLOYEES

- a. The contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, fuel, heat, sanitary facilities, water, scaffolding and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.
- b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.
- c. Upon notice, the contractor shall furnish evidence as to quality of materials.
- d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. However, the contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request for substitution of materials, items, or equipment shall

be submitted to the designer for approval or disapproval; the designer prior to the opening of bids shall make such approval or disapproval. Alternate materials may be requested after the award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and owner approves.

- e. The designer is the judge of equality for proposed substitution of products, materials or equipment.
- f. If at any time during the construction and completion of the work covered by these contract documents, the language, conduct, or attire of any workman of the various crafts be adjudged a nuisance to the owner or designer, or if any workman be considered detrimental to the work, the contractor shall order such parties removed immediately from grounds.
- g. The Contractor shall cooperate with the designer and the owner in coordinating construction activities.
- h. The Contractor shall maintain qualified personnel and effective supervision at the site at all times during the project and exercise the appropriate quality control program to ensure compliance with the project drawings and specifications. The designer is responsible for determining compliance with the drawings and specifications.

9. CODES, PERMITS AND INSPECTIONS

The Contractor shall obtain the required permits, if required, give all notices, and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the Contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the Designer in writing. If the Contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the Owner, he shall bear all cost arising there from.

All work under this contract shall conform to the current North Carolina Building Code and other state and national codes as are applicable.

Projects constructed by the State of North Carolina or by any agency or institution of the State are not subject to county or municipal building codes and may* not be subject to inspection by county or municipal authorities. Where appropriate, the Contractor shall, cooperate with the county or municipal authorities by obtaining building permits. The contractor at no cost may obtain permits to the owner.

All fire alarm work shall be in accordance with the latest State Construction Office (SCO) *Guidelines for Fire Alarm Installation* (NFPA72). Where the contract documents are in conflict with the SCO guidelines, the SCO guidelines shall govern. The Contractor shall be responsible for all the costs for the correction of the work where he installs it in conflict with the latest edition of the SCO *Guidelines for Fire Alarm Installation*.

- *Inspection and certification of compliance by local authorities is necessary if an architect or engineer was not employed on the project, or if the plans and specifications were not approved and the construction inspected by the State Construction Office.

10. PROTECTION OF WORK, PROPERTY, THE PUBLIC AND SAFETY

- a. The contractors shall be jointly responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the owner or designer, and by laws or ordinances governing such conditions. They shall be responsible for any damage to the owner's property or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. They shall be responsible for and pay for any damages caused to the owner. All contractors shall have access to the project at all times, except as indicated in the Supplemental General Conditions.
- b. The contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building, whether set by him, or any of the

subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the owner.

- c. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the designer and owner.
- d. The contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations by building substantial boxes around it. He shall barricade all walks, roads, etc., as directed by the designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.
- e. The contractor shall provide all necessary safety measures for the protection of all persons on the job, including the requirements of the A.G.C. *Accident Prevention Manual in Construction*, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the work. He shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. He shall protect against damage or injury resulting from falling materials and he shall maintain all protective devices and signs throughout the progress of the work.
- f. The contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, *Federal Register*), and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.
- i. In the event of emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the contractor is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage. Any compensation claimed by the contractor on account of such action shall be determined as provided for under Article 13(b).
- j. Any and all costs associated with correcting damage caused to adjacent properties of the construction site or staging area shall be borne by the contractor. These costs shall include but not be limited to flooding, mud, sand, stone, debris, and discharging of waste products.

11. SUBCONTRACTS AND SUBCONTRACTORS

The Contractor is and remains fully responsible for his own acts or omissions as well as those of any subcontractor or of any employee of either. The Contractor agrees that no contractual relationship exists between the subcontractor and the Owner in regard to the contract, and that the subcontractor acts on this work as an agent or employee of the Contractor.

12. CONTRACTOR-SUBCONTRACTOR RELATIONSHIPS

The Contractor agrees that the terms of these Contract Documents shall apply equally to each Subcontractor as to the Contractor, and the Contractor agrees to take such action as may be necessary to bind each Subcontractor to these terms. The Contractor further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to Contractor-Subcontractor relationships. The Owner reserves the right to limit the amount of portions of work to be subcontracted as hereinafter specified.

13. CHANGES IN THE WORK AND CLAIMS FOR EXTRA COST

- a. The owner may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the contractor from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.
- b. Except in an emergency endangering life or property, no change shall be made by the contractor except upon receipt of approved change order from the designer, countersigned by the owner authorizing such change. No claim for adjustments of the contract price shall be valid unless this

procedure is followed. Should a claim for extra compensation by the contractor be denied by the designer or the owner, the contractor may pursue his claim in accordance with G.S. 143-135.3.

In the event of emergency endangering life or property, the contractor may be directed to proceed on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as specified by the designer or owner, a correct account of costs together with all proper invoices, payrolls and supporting data. Upon completion of the work the change order will be prepared as outlined under either Method "c(1)" or Method "c(2)" or both.

- c. In determining the values of changes, either additive or deductive, contractors are restricted to the use of the following methods:
1. Where the extra work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, Owner and State Construction Office the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except in such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c (2) herein. If neither party elects to proceed under c (2), then unit prices shall apply.
 2. The contracting parties shall negotiate and agree upon the equitable value of the change prior to issuance of the change order, and the change order shall stipulate the corresponding lump sum adjustment to the contract price.
- d. Under Paragraph "b" and Methods "c(2)" above, the allowances for overhead and profit combined shall be as follows: all contractors (the single contracting entity (prime), his subcontractors (1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc.) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1st tier, 2nd tier, 3rd tier, etc. contractors shall be allowed a maximum of 2.5% on the contracted work of their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.
- e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:
1. The actual costs of materials and supplies incorporated or consumed as part of the work;
 2. The actual costs of labor expended on the project site; labor expended in coordination, change order negotiation, record document maintenance, shop drawing revision or other tasks necessary to the administration of the project are considered overhead whether they take place in an office or on the project site.
 3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker's compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed thirty percent (30%) of the actual costs of labor;
 4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the work;
 5. The actual costs of premiums for bonds, insurance, permit fees and sales or use taxes related to the work.

Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the owner.

- f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods. All change orders shall be supported by a unit cost breakdown showing method of arriving at net cost as defined above.
- g. Change orders shall be submitted by the contractor in writing to the owner/designer for review and approval. The contractor will provide such proposal and supporting data in suitable format. The designer shall verify correctness. Delay in the processing of the change order due to lack of proper submittal by the contractor of all required supporting data shall not constitute grounds for a time extension or basis of a claim. Within fourteen (14) days after receipt of the contractor's accepted proposal including all supporting documentation required by the designer, the designer shall prepare the change order and forward to the contractor for his signature or otherwise respond, in writing, to the contractor's proposal. Within seven (7) days after receipt of the change order executed by the contractor, the designer shall, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. The owner shall execute the change order, within seven (7) days of receipt.

At the time of signing a change order, the contractor shall be required to certify as follows:

"I certify that my bonding company will be notified forthwith that my contract has been changed by the amount of this change order, and that a copy of the approved change order will be mailed upon receipt by me to my surety."

- h. A change order, when issued, shall be full compensation, or credit, for the work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.
- i. If, during the progress of the work, the owner requests a change order and the contractor's terms are unacceptable, the owner, may require the contractor to perform such work on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as specified by the Designer or owner, a correct account of cost together with all proper invoices, payrolls and supporting data. Upon completion of the work a change order will be prepared with allowances for overhead and profit per paragraph d. above and "net cost" and "cost" per paragraph e. above. Without prejudice, nothing in this paragraph shall preclude the owner from performing or to have performed that portion of the work requested in the change order.

14. ANNULMENT OF CONTRACT

If the contractor fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the contractor shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the owner may give notice in writing, sent by certified mail, return receipt requested, to the contractor and his surety (if applicable) of such delay, neglect or default, specifying the same, and if the contractor within a period of seven (7) days after such notice shall not proceed in accordance therewith, then the owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the contractor, or the surety (if applicable) shall fail to take over the work to be done under this contract within seven (7) days after being so notified and notify the owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of said contractor, to appropriate or use any or all

contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the owner, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said contractor and surety (if applicable). In case the expense so incurred by the owner shall be less than the sum which would have been payable under the contract, if it had been completed by said contractor, then the said contractor and surety (if applicable) shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the contractor and the surety (if applicable) shall be liable and shall pay to the owner the amount of said excess.

15. TERMINATION FOR CONVENIENCE

- a. Owner may at any time and for any reason terminate Contractor's services and work at Owner's convenience, after notification to the contractor in writing via certified mail. Upon receipt of such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.
- b. Upon such termination, Contractor shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, (2) such other costs actually incurred by Contractor as approved by Owner; (3) plus ten percent (10%) of the cost of the balance of the work to be completed for overhead and profit. There shall be deducted from such sums as provided in this subparagraph the amount of any payments made to Contractor prior to the date of the termination of this Agreement. Contractor shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment.

16. OWNER'S RIGHT TO DO WORK

If, during the progress of the work or during the period of guarantee, the contractor fails to prosecute the work properly or to perform any provision of the contract, the owner, after seven (7) days' written notice sent by certified mail, return receipt requested, to the contractor from the designer, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the contractor, such action and cost of same having been first approved by the designer. Should the cost of such action of the owner exceed the amount due or to become due the contractor, then the contractor or his surety, or both, shall be liable for and shall pay to the owner the amount of said excess.

17. REQUESTS FOR PAYMENT

Contractor shall refer to the Supplemental General Conditions for specific directions on payment schedule, procedures and the name and address where to send applications for payments for this project. It is imperative that invoices be sent only to the above address in order to assure proper and timely delivery and handling.

The Designer/Owner will process all Contractor pay requests as the project progresses. The Contractor shall receive payment within thirty (30) consecutive days after Designer/Owner's approval of each pay request. Payment will only be made for work performed as determined by the Designer/Owner.

Retainage:

- a. Retainage withheld will not exceed 5% at any time.
- b. The same terms apply to general contractor and subcontractors alike.
- c. Following 50% completion of the project no further retainage will be withheld if the contractor/subcontractor has performed their work satisfactorily.
- d. Exceptions:
 1. Owner/Contractor can reinstate retainage if the contractor/subcontractor does not continue to perform satisfactorily.

2. Following 50% completion of the project, the owner is authorized to withhold additional retainage from a subsequent periodic payment if the amount of retainage withheld falls below 2.5%.

Final payment will be made within forty-five (45) consecutive days after acceptance of the work, receipt of marked-up "as-built" drawings and specifications and the submission both of notarized Contractor's affidavit and final pay request. All pay requests shall be submitted to the Designer/Owner for approval.

THE CONTRACTOR'S FINAL PAYMENT AFFIDAVIT SHALL STATE: "THIS IS TO CERTIFY THAT ALL COSTS OF MATERIALS, EQUIPMENT, LABOR, SUBCONTRACTED WORK, AND ALL ELSE ENTERING INTO THE ACCOMPLISHMENT OF THIS CONTRACT, INCLUDING PAYROLLS, HAVE BEEN PAID IN FULL."

18. PAYMENTS WITHHELD

The designer with the approval of the Owner may withhold payment for the following reasons:

- a. Faulty work not corrected.
- b. The unpaid balance on the contract is insufficient to complete the work in the judgment of the designer.
- c. To provide for sufficient contract balance to cover liquidated damages that will be assessed.
- d. The secretary of the Department of Administration may authorize the withholding of payment for the following reasons:
 - i. Claims filed against the contractor or evidence that a claim will be filed.
 - ii. Evidence that subcontractors have not been paid.

When grounds for withholding payments have been removed, payment will be released. Delay of payment due the contractor without cause will make owner liable for payment of interest to the contractor as provided in G.S.143-134.1. As provided in G.S. 143-134.1(e), the owner shall not be liable for interest on payments withheld by the owner for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

19. MINIMUM INSURANCE REQUIREMENTS

The work under this contract shall not commence until the contractor has obtained all required insurance and verifying certificates of insurance have been approved in writing by the owner. These certificates shall document that coverages afforded under the policies will not be cancelled, reduced in amount or coverages eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the owner of such alteration or cancellation. If endorsements are needed to comply with the notification or other requirements of this article copies of the endorsements shall be submitted with the certificates.

a. Worker's Compensation and Employer's Liability

The contractor shall provide and maintain, until final acceptance, workmen's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of

b. Public Liability and Property Damage

The contractor shall provide and maintain, until final acceptance, comprehensive general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property

damages which may arise from operations under this contract, whether such operations be by the contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

Bodily Injury: \$500,000 per occurrence
Property Damage: \$100,000 per occurrence / \$300,000 aggregate

In lieu of limits listed above, a \$500,000 combined single limit shall satisfy both conditions.

Such coverage for completed operations must be maintained for at least two (2) years following final acceptance of the work performed under the contract.

c. Property Insurance (Builder's Risk/Installation Floater)

The contractor shall purchase and maintain property insurance until final acceptance, upon the entire work at the site to the full insurable value thereof. This insurance shall include the interests of the owner, the contractor, the subcontractors and sub-subcontractors in the work and shall insure against the perils of fire, wind, rain, flood, extended coverage, and vandalism and malicious mischief. If the owner is damaged by failure of the contractor to purchase or maintain such insurance, then the contractor shall bear all reasonable costs properly attributable thereto; the contractor shall effect and maintain similar property insurance on portions of the work stored off the site when request for payment per articles so includes such portions.

d. Deductible

Any deductible, if applicable to loss covered by insurance provided, is to be borne by the contractor.

e. Other Insurance

The contractor shall obtain such additional insurance as may be required by the owner or by the General Statutes of North Carolina including motor vehicle insurance, in amounts not less than the statutory limits.

f. Proof of Carriage

The contractor shall furnish the owner with satisfactory proof of carriage of the insurance required before written approval is granted by the owner.

20. ASSIGNMENT

No assignment of the Contractor's obligations or the Contractor's right to receive payment hereunder shall be permitted. However, upon written request approved by the Owner and solely as a convenience to the Contractor, the Owner may: (1) forward the Contractor's payment check directly to any person or entity designated by the Contractor, and (2) include any person or entity designated by Contractor as a joint payee on the Contractor's payment check. In no event shall such approval and action obligate the Owner to anyone other than the Contractor, and the Contractor shall remain responsible for fulfillment of all contract obligations.

21. CLEANING UP AND RESTORATION OF SITE

The Contractor shall keep the sites and surrounding area reasonably free from rubbish at all times and shall remove debris from the site from time to time or when directed to do so by the Owner. Before final inspection and acceptance of the project, the Contractor shall thoroughly clean the sites, and completely prepare the project and site for use by the Owner.

At the end of construction, the contractor shall oversee and implement the restoration of the construction site to its original state. Restoration includes but not limited to walks, drives, lawns, trees and shrubs, corridors, stairs and other elements shall be repaired, cleaned or otherwise restored to their original state.

22. GUARANTEE

The contractor shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the final acceptance of the work and shall replace such defective materials or workmanship without cost to the owner.

Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective equipment or materials, without cost to the owner, within the manufacturer's warranty period.

Additionally, the owner may bring an action for latent defects caused by the negligence of the contractor, which is hidden or not readily apparent to the owner at the time of beneficial occupancy or final acceptance, whichever occurred first, in accordance with applicable law.

Guarantees for roofing workmanship and materials shall be stipulated in the specifications sections governing such roof, equipment, materials, or supplies.

23. STANDARDS

All manufactured items and/or fabricated assemblies subject to operation under pressure, operation by connection to an electric source, or operation involving a connection to a manufactured, natural, or LP gas source shall be constructed and approved in a manner acceptable to the appropriate State inspector which customarily requires the label or re-examination listing or identification marking of appropriate safety standard organization, such as the American Society of Mechanical Engineers for pressure vessels; the Underwriters Laboratories and/or National Electrical Manufacturers Association for electrically operated assemblies; or the American Gas Association for gas operated assemblies, where such approvals of listings have been established for the type of device offered and furnished. Further, all items furnished shall meet all requirements of the Occupational Safety and Health Act (OSHA), and State and federal requirements relating to clean air and water pollution.

All equipment and products must be independent third party tested and labeled (UL, FM, or CTS) before final connections to Owner services or utilities.

24. TAXES

- a. Federal excise taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3442(3)).
- b. Federal transportation taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3475(b) as amended).
- c. North Carolina sales tax and use tax, as required by law, do apply to materials entering into state work and such costs shall be included in the bid proposal and contract sum.
- d. Local option sales and use taxes, as required by law, do apply to materials entering into state work as applicable and such costs shall be included in the bid proposal and contract sum.
- e. **Accounting Procedures for Refund of County Sales & Use Tax**

Amount of county sales and use tax paid per contractor's statements:

Contractors performing contracts for state agencies shall give the state agency for whose project the property was purchased a signed statement containing the information listed in G.S. 105-164.14(e).

The Department of Revenue has agreed that in lieu of obtaining copies of sales receipts from contractors, an agency may obtain a certified statement as of April 1, 1991 from the contractor setting forth the date, the type of property and the cost of the property purchased from each vendor, the county in which the vendor made the sale and the amount of local sales and use taxes paid thereon. If the property was purchased out-of-state, the county in which the property was

delivered should be listed. The contractor should also be notified that the certified statement may be subject to audit.

In the event the contractors make several purchases from the same vendor, such certified statement must indicate the invoice numbers, the inclusive dates of the invoices, the total amount of the invoices, the counties, and the county sales and use taxes paid thereon.

Name of taxing county: The position of a sale is the retailer's place of business located within a taxing county where the vendor becomes contractually obligated to make the sale. Therefore, it is important that the county tax be reported for the county of sale rather than the county of use.

When property is purchased from out-of-state vendors and the county tax is charged, the county should be identified where delivery is made when reporting the county tax.

Such statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of county sales or use tax paid thereon by the contractor.

Similar certified statements by his subcontractors must be obtained by the general contractor and furnished to the claimant.

Contractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

25. EQUAL OPPORTUNITY CLAUSE

The non-discrimination clause contained in Section 202 (Federal) 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 implementing rules and regulations prescribed by the secretary of Labor, are incorporated herein.

The contractor(s) agree not to discriminate against any employee or applicant for employment because of physical or mental disabilities in regard to any position for which the employee or applicant is qualified. The contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified individuals with such disabilities without discrimination based upon their physical or mental disability in all employment practices.

26. MINORITY BUSINESS PARTICIPATION

GS 143-128.2 establishes a ten percent (10%) goal for participation by minority business in total value of work for each State building project.

For construction contracts with a value of less than \$300,000, the Owner has the responsibility to make a good faith effort to solicit minority bids and to attain the goal. The contractor shall include with his bid a completed Identification of HUB Certified/Minority Business Participation form. Contractor shall submit completed Appendix E MBE Documentation for Contract Payments form with final payment request.

For construction contracts with a value of \$300,000 or greater, the contractor shall comply with the document *Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts* including Identification of Minority Business Participation, Affidavits A, B, C, and D, and Appendix E. These forms provided herein are hereby incorporated and made a part of this contract.

27. ACCESS TO PERSONS AND RECORDS

The State Auditor shall have access to persons and records as a result of all contracts or grants entered into by the Owner in accordance with General Statute 147-64.7. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or relating to Contractor's requests for payment, requests for

change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for lost efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

28. GOVERNING LAWS

This contract is made under and shall be governed by and construed in accordance with the laws of the State of North Carolina. The Contractor shall comply with all applicable federal, State and local laws, statutes, ordinances and regulations including, but not limited to, the Omnibus Transportation Act of 1991 and its implementing regulations.

29. CONTRACTOR EVALUATION

The contractor's overall work performance on the project shall be fairly evaluated in accordance with the State Building Commission policy and procedures, for determining qualifications to bid on future State projects. In addition to final evaluation, an interim evaluation may be prepared during the progress of project. The owner may request the contractor's comments to evaluate the designer.

SUPPLEMENTARY GENERAL CONDITIONS

PART 1 GENERAL

1.01 SUMMARY

- A. The following Supplementary General Conditions of the Contract augment the State Construction Office, North Carolina Department of Administration Informal Contract "General Conditions".
- B. Where any article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplementary general conditions, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.
- C. Unless otherwise stated, the terms used in these Supplementary Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

1.02 ARTICLE 5 - SUBMITTAL DATA

- A. ADD the following paragraph to Article 5:
 - a. The GC shall submit with initial approval of the design documents for compliance and accuracy, electronic copies in PDF format of all shop drawings and submittals. Physical samples shall be submitted for color and workmanship (mock-up) approval. All Shop Drawings, Samples and Submittals for approval shall be completed within Thirty (30) days after award of the sub-contract agreement between the GC and the specialty subcontractor.
- B. ADD the following paragraph to Article 5:
 - a. The GC shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions or modifications including those requested by the Designer on previous submittals. In the absence of such written notice, the Designer's approval of a resubmission shall not apply to such revisions.

1.03 ARTICLE 7 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

- A. MODIFY the second paragraph of Article 7 to read:
 - a. The contractor shall maintain at the job office, a day-to-day record of work-in-place that is at variance with the contract documents. Such variations shall be fully noted on project drawings by the contractor and submitted to the Designer and Owner upon request and at project completion and no later than 30 days after final acceptance of the project.
- B. ADD the following paragraph to Article 7:
 - a. The GC shall submit to the Designer/Owner a copy of the daily field reports by its field supervision listing but not limited to personnel on site (including all subcontractors); weather conditions; major scopes of work under construction; material deliveries; safety incidents; progress photographs, and inspections.

1.04 ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES

- A. ADD the following paragraphs to Article 8:

- a. The GC shall provide the Owner a complete list of addresses and emergency telephone numbers for the GC, his key personnel, and all subcontractors. This list shall be provided to the Owner prior to beginning the Work and shall be updated regularly with the updated provided to the Owner.
- b. The GC acknowledges and agrees that, to the best of its knowledge, neither GC nor its employees, representatives or sub-contractors has at any time (1) been charged with personal or professional misconduct; (2) been convicted of any crime (other than traffic fines); (3) been required to register as a sex offender under Title I of the Sex Offender Registration and Notification Act of 2006 (SORNA). GC shall notify Owner immediately should any of the above conditions come into being.
- c. The GC and subcontractors at its cost, agrees to perform criminal background checks, using services through companies such as 123nc.com, and screen all its employees, Consultants, and representatives prior to assigning them to perform any Service at Western Carolina University. Such background checks will be made available to Western Carolina University upon request.
- d. The GC and subcontractors shall verify the work authorization of all employees that work on Western Carolina University property through E-Verify. Such authorization will be made available to Western Carolina University upon request.
- e. Should an accident or disruption occur on the project work site, the GC shall notify Western Carolina University Safety Officer immediately.
- f. The GC and each of its subcontractors shall be responsible for security to his/their equipment and the site-stored materials under his/their jurisdiction whether paid for by the Owner or not, until acceptance of the Project.

1.05 ARTICLE 9 – CODES, PERMITS AND INSPECTIONS

A. ADD the following paragraph to Article 9:

- a. Minimum of (72) hours prior to any interruption in any minor utility or other services, and minimum 7 days for any interruption of major utility or service, the GC shall request and obtain permission from the Owner for such interruption. Failure of the GC to obtain Owner permission shall not be grounds for an extension of time.
- b. Prior to performing any “hot work” or any work above ceiling in existing buildings, the GC shall obtain a permit for such from the Owner’s Facilities Management Department.
- c. The GC shall comply with Owner’s Interim Life Safety Plan requirements to maintain egress from all occupied buildings.
- d. Upon completion of the Work, the Contractor shall deliver to the Owner original copies of all required certificates of inspection.

1.06 ARTICLE 17 – REQUESTS FOR PAYMENT

Performance and Payment Bonds not required.

SUPPLEMENTARY GENERAL CONDITIONS

A. ADD the following to the first paragraph, Article 17:

Contractor shall submit requests for payment to Designer monthly based on approved Schedule of Values.

B. ADD the following paragraph to the end of Article 17:

The application for payments shall be submitted on AIA Documents G702 and G702A. The GC shall include on each monthly Application for Payment, AIA Documents G702 and G702A, the following statement:

"We certify that the Surety for this Project has been duly notified of the amount of this request."

Unless exception to pay is made by the Surety to the Architect within four (4) calendar days following the date of request, it will be assumed that the Surety concurs in the payment of this application.

1.07 ARTICLE 19 MINIMUM INSURANCE REQUIREMENTS

A. MODIFY ARTICLE 19, Section 'a' under "Worker's Compensation and Employer's Liability" header to read:

- a. The contractor shall provide and maintain, until final acceptance, workmen's compensation insurance, as required by law, as well as employer's liability coverage for claims and all perils for errors, omissions, and damages of any kind or character which may arise out of or result from GC's performance under this Agreement with minimum limits of \$100,000 per occurrence.

B. ADD the following paragraphs to ARTICLE 19:

- a. Automobile Liability insurance (the "Auto Insurance") for claims and all perils for errors, omissions, and damages of any kind or character which may arise out of or result from GC's performance under this Agreement. The Auto Insurance shall cover owned, non-owned, and hired vehicles. The Auto Insurance shall be written in the amount of no less than \$500,000 Combined Single Limit (property and bodily injury) per occurrence.
- b. Provide insurance certificate(s) to this office with language appropriately inserted in the insurance certificate block provided for Special Provisions, as follows:
- c. "Notwithstanding the preprinted cancellation provisions on this form, coverages afforded under the policies will not be cancelled, reduced in amount nor will any coverages be eliminated until at least thirty (30) days after mailing written notice, by certified mail, return receipt requested, to the insured and the owner, of such alteration or cancellation."

1.08 ARTICLE 21 – CLEANING UP AND RESTORATION OF SITE

A. ADD the following paragraph to Article 21

Contractor shall provide dumpster for project related construction debris and trash. University dumpster/trash bins shall not be used for construction debris.

1.09 ARTICLE 22 – GUARANTEE

A. ADD the following paragraphs to Article 22:

Individual specifications requirements shall have warranties start at the date of Final Acceptance.

B. Roofing Guarantee

The following paragraph is hereby added and shall become a part of the Guarantee of the General Conditions of the Contract. The substitution of an equal or longer-term manufacturer's warranty in lieu of this requirement will not be accepted.

The Roofing Contractor shall warrant the materials and workmanship of the roofing system against leakage and against defects due to faulty materials, workmanship and contract negligence for a period of two (2) years following acceptance of the project by the Owner.

The Roofing System Manufacturer shall inspect the installation and warrant the materials and workmanship of the roofing system against leakage for a minimum period of ten (10) years following acceptance of the project by the Owner.

1.10 ARTICLE 30 - TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME

A. ADD Article 30 with the heading 'TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME' and the following language:

- a. The GC shall commence work to be performed under this agreement on a date to be specified in a written order from the Designer and shall fully complete all work by July 31st, 2021. For each day in excess of the above number of days, the Contractor shall pay to the Owner the sum of \$100 (One-hundred Dollars and 00/100) per day as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said GC to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.
- b. The GC agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate or progress as will ensure full completion thereof within the time specified.
- c. If the Contractor is delayed at any time in the progress of his work by any act or negligence of the Owner, his employees or his separate contractor, by changes ordered in the work; by abnormal weather conditions; by any causes beyond the Contractor's control or by other causes deemed justifiable by Owner, then the contract time may be reasonably extended in a written order from the Owner upon written request from the contractor within ten days following the cause for delay.

- d. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays.
- e. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents.

1.11 ARTICLE 31 - CONSTRUCTION SUPERVISION AND SCHEDULE

A. ADD Article 31 with the heading 'CONSTRUCTION SUPERVISION AND SCHEDULE' and the following language:

- a. Promptly following Contract Award, the Contractor shall hold a meeting for the purpose of establishing and preparing Contractor's construction schedule for the Work. Each major subcontractor shall be represented. The Contractor's construction schedule shall be in a detailed format satisfactory to the Owner and the Designer. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and the Designer and re-submitted for acceptance. The Contractor' construction schedule shall be sufficiently detailed to permit proper and complete coordination of all trades in each portion of the Work. Therefore, the Contractor's construction schedule shall specifically indicate the following dates:
 - 1. Dates scheduled for completion of installation of major items of equipment.
 - 2. The anticipated date of Substantial Completion.
 - 3. The date of Final Completion of the Project, as established by the Contract.
- b. The accepted Contractor's construction schedule, bearing the approval signature of the Contractor and major subcontractors, shall be distributed to all interested parties in quantities as required. No application for payment will be approved until the Contractor's construction schedule has been received and accepted by Owner.

1.12 ARTICLE 32 – UTILITIES

A. ADD Article 32 with the heading 'UTILITIES' and the following language:

Owner may provide certain utilities such as power or water with connections and extensions by the Contractor. Contractor shall furnish portable toilets for project contractor(s) use. Campus restrooms shall not be used by contractor(s).

1.13 ARTICLE 33 – USE OF SITE

A. ADD Article 33 with the heading 'USE OF SITE' and the following language:

Contractor shall coordinate with Owner the use of site and construction work hours. Contractor usage of parking spaces shall be coordinated with Owner.

1.14 ARTICLE 34 - COPIES OF DRAWINGS AND SPECIFICATIONS

A. ADD Article 34 with the heading 'COPIES OF DRAWINGS AND SPECIFICATIONS' and the following language:

The Designer shall furnish free of charge to the General Contractor (GC) or Construction Manager (CM) an electronic copy in PDF format of the bid documents. Paper copies of drawing sets and specifications shall be furnished at cost, including mailing at the request of the General Contractor or Construction Manager. This cost shall be stated in the bidding documents.

1.15 ARTICLE 35 – UNIVERSITY POLICIES

A. ADD Article 35 with the heading 'UNIVERSITY POLICIES' and the following language:

a. Instruct employees, subcontractors and their agents, and other persons performing work as to the following (post in a conspicuous location):

1. Use of phones in existing campus buildings is not permitted.
2. Use of toilets and facilities in existing campus buildings is not permitted (without Owner's permission).
3. No smoking will be permitted in any adjacent buildings or in new structure.
4. Fraternalization with building occupants or Owner's personnel is not permitted.
5. Alcoholic beverages and non-prescription drugs are not permitted on the premises.
6. Wearing of adequate clothing at all times is required.
7. Use of food services (unless permission is given by the Owner) is not permitted.

B. All personnel are restricted to Contract Limit Area and areas of alteration in existing building, and site.

C. At any time during the construction and completion of the work covered by these Specifications, if the conduct of any workman of the various crafts be adjudged ungentlemanly and a nuisance to the Owner or Designer, or if any workman be considered incompetent or detrimental to the work, the Contractor shall order such parties removed immediately from the grounds."

END OF SECTION

REFER TO DRAWINGS AND PROJECT SPECIFICATIONS FOR DETAILS

State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of _____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- ___ **1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government-maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- ___ **2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses or providing these documents to them at least 10 days before the bids are due.
- ___ **3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- ___ **4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- ___ **5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- ___ **6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- ___ **7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- ___ **8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- ___ **9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- ___ **10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

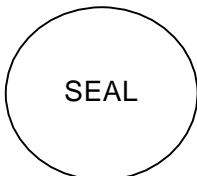
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

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

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

State of North Carolina - AFFIDAVIT B - Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____

(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____

_____ contract.

(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

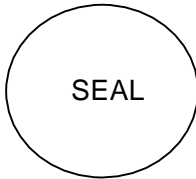
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.
 This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
 (Name of Bidder)

_____ (Project Name)
 Project ID# _____ Amount of Bid \$ _____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

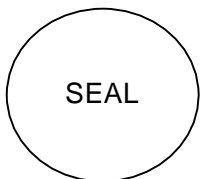
*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date: _____ Name of Authorized Officer: _____



Signature: _____

Title: _____

State of _____, County of _____ Subscribed
 and sworn to before me this _____ day of _____ 20____ Notary Public
 My commission expires _____

State of North Carolina - AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the _____
(Name of Bidder)

_____ (Project Name)

Project ID# _____ Amount of Bid \$ _____

I will expend a minimum of _____% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

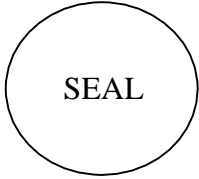
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____ Subscribed
and sworn to before me this _day of _20_____ Notary Public
My commission expires _____

GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN STATE CONSTRUCTION CONTRACTS

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager at risk, and alternative contracting methods, on State construction projects in the amount of \$300,000 or more. The legislation provides that the State shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

SECTION A: INTENT

It is the intent of these guidelines that the State of North Carolina, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded shall cooperate and in good faith do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from minority-business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

SECTION B: DEFINITIONS

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
 - a. Black, that is, a person having origins in any of the black racial groups in Africa;
 - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
 - c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
 - d. American Indian, that is, a person having origins in any of the original peoples of North America; or e. Female

2. Minority Business - means a business:
 - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
 - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.

3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".

4. Public Entity - means State and all public subdivisions and local governmental units.

5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.

6. Designer – Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering, work.

7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

SECTION C: RESPONSIBILITIES

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program, which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested.
- b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
- c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- (1) Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
- (2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the State Construction Office and other public entities.
- (3) Inform minority businesses of the contracting and subcontracting process for public construction building projects.
- (4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects.
- (5) The HUB Office also oversees the minority business program by:
 - a. Monitoring compliance with the program requirements.
 - b. Assisting in the implementation of training and technical assistance programs.
 - c. Identifying and implementing outreach efforts to increase the utilization of minority businesses.
 - d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. State Construction Office

The State Construction Office will be responsible for the following:

- a. Furnish to the HUB Office a minimum of twenty-one days prior to the bid opening the following:
 - (1) Project description and location;
 - (2) Locations where bidding documents may be reviewed;
 - (3) Name of a representative of the owner who can be contacted during the advertising period to advise who the prospective bidders are;
 - (4) Date, time and location of the bid opening.
 - (5) Date, time and location of prebid conference, if scheduled.
- b. Attending scheduled prebid conference, if necessary, to clarify requirements of the general statutes regarding minority-business participation, including the bidders' responsibilities.

- c. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal, that must be complied with, if the bid is to be considered as responsive, prior to award of contracts. The State reserves the right to reject any or all bids and to waive informalities.
- d. Reviewing of minority business requirements at Preconstruction conference.
- e. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
- f. Provide statistical data and required reports to the HUB Office.
- g. Resolve any protest and disputes arising after implementation of the plan, in conjunction with the HUB Office.

3. Owner

Before awarding a contract, owner shall do the following:

- a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and non-minority businesses.
- b. Attend the scheduled prebid conference.
- c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the public entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
 - 1. A description of the work for which the bid is being solicited.
 - 2. The date, time, and location where bids are to be submitted.
 - 3. The name of the individual within the owner's organization who will be available to answer questions about the project.
 - 4. Where bid documents may be reviewed.
 - 5. Any special requirements that may exist.
- d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
- e. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
- f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award to the State Construction Office.
- g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award to State Construction Office.
- h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
- i. Make documentation showing evidence of implementation of Owner's responsibilities available for review by State Construction Office and HUB Office, upon request

4. Designer

Under the single-prime bidding, separate prime bidding, construction manager at risk, or alternative contracting method, the designer will:

- a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
- b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
- c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
- d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with

corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.

- e. During construction phase of the project, review “MBE Documentation for Contract Payment” – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the State Construction Office.
- f. Make documentation showing evidence of implementation of Designer’s responsibilities available for review by State Construction Office and HUB Office, upon request.

5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors

Under the single-prime bidding, the separate-prime bidding, construction manager at risk and alternative contracting methods, contractor(s) will:

- a. Attend the scheduled prebid conference.
- b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
- c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
 - (1) A description of the work for which the subbid is being solicited.
 - (2) The date, time and location where subbids are to be submitted.
 - (3) The name of the individual within the company who will be available to answer questions about the project.
 - (4) Where bid documents may be reviewed.
 - (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.

- d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
- f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by State Construction Office and HUB Office, upon request.
- g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
- h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
- i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), “MBE Documentation for Contract Payment” – (Appendix E), for designer’s review.
- j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.

- k. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
- l. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. Minority Business Responsibilities

While minority businesses are not required to become certified in order to participate in the State construction projects, it is recommended that they become certified and should take advantage of the appropriate technical assistance that is made available. In addition, minority businesses who are contacted by owners or bidders must respond promptly whether or not they wish to submit a bid.

SECTION 4: DISPUTE PROCEDURES

It is the policy of this state that disputes that involves a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

SECTION 5: These guidelines shall apply upon promulgation on state construction projects. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: www.nc-sco.com

SECTION 6: In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing minority business participation in the state construction program.

MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts** are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: <http://www.nc-sco.com>

MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts **or** affidavit (Affidavit B) of self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal.

OR

Provide Affidavit D, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, **with documentation of Good Faith Effort, if the percentage is not equal to the applicable goal.**

OR

Provide Affidavit B, which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type project.

The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.

MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the State for performance of this contract. Failure to comply with any of these statements, affidavits or intentions, or with the minority business Guidelines shall constitute a breach of the contract. A finding by the State that any information submitted either prior to award of the contract or during the performance of the contract is inaccurate, false or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the State whether to terminate the contract for breach.

In determining whether a contractor has made Good Faith Efforts, the State will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts. Good Faith Efforts include:

- (1) Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government-maintained lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.
- (2) Making the construction plans, specifications and requirements available for review by prospective minority businesses or providing these documents to them at least 10 days before the bid or proposals are due.
- (3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.
- (4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- (5) Attending any prebid meetings scheduled by the public owner.
- (6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.
- (7) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- (8) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- (9) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- (10) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

APPENDIX E

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: _____

Address & Phone: _____

Project Name: _____

Pay Application #: _____ Period: _____

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT PAID THIS MONTH	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: _____ Approved/Certified By: _____
Name

Title

Signature

SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT

STATE OF NORTH CAROLINA
 COUNTY SALES AND USE TAX REPORT
 SUMMARY TOTALS AND CERTIFICATION
(Invoices are not to be submitted for reimbursement of sales taxes paid.)

CONTRACTOR: _____

Page _____ of _____

PROJECT: _____

FOR PERIOD: _____

	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL FOR COUNTY OF:	TOTAL ALL COUNTIES
CONTRACTOR							
SUBCONTRACTOR(S)*							
COUNTY TOTAL							

* Attach subcontractor(s) report(s)
 ** Must balance with Detail Sheet(s)

I certify that the above figures do not include any tax paid on supplies, tools and equipment which were used to perform this contract and only includes those building materials, supplies, fixtures and equipment which actually became a part of or annexed to the building or structure. I certify that, to the best of my knowledge, the information provided here is true, correct, and complete.

Sworn to and subscribed before me,

This the _____ day of _____, 19____

 Notary Public

My Commission Expires: _____

Seal

 Signed

 Print or Type Name of Above

NOTE:
 This certified statement may be subject to audit.

STATE OF NORTH CAROLINA
 SALES AND USE TAX REPORT DETAIL
(Invoices are not to be submitted for reimbursement of sales taxes paid.)

CONTRACTOR: _____

Page _____ of _____

SUBCONTRACTOR _____

FOR PERIOD: _____

PROJECT: _____

PURCHASE DATE	VENDOR NAME	INVOICE NUMBER	TYPE OF PROPERTY	INVOICE TOTAL	COUNTY TAX PAID	COUNTY OF SALE *
				\$	\$	
				TOTAL:	\$	

* If this is an out-of-state vendor, the County of Sale should be the county to which the merchandise was shipped.

**STATE OF NORTH CAROLINA
WESTERN CAROLINA UNIVERSITY
CHANGE ORDER
FOR
INFORMAL CONTRACTS**

CHANGE ORDER NO.:

CONTRACTOR NAME:

CONTRACTOR TYPE:

PROJECT LOCATION / TITLE:

PROJECT NO.:

- | | |
|---|-------|
| 1. Amount of Original Contract | \$ |
| 2. Add Amount Previous Orders | \$ |
| 3. Add Amount This Order | \$ |
| 4. Total Adds (Lines 2 plus 3) | \$ |
| 5. Deduct Amount Previous Orders | \$ |
| 6. Deduct Amount This Order | \$ |
| 7. Total Deducts (Lines 5 plus 6) | (\$) |
| 8. Revised Contract Total (Lines 1 plus 4 less 7) | \$ |

Note: Do not use both Lines 3 and 6 on this change order. Use Line 3 if this change order is an Addition, or use Line 6 if this change order is a Deduction.

Contract Time of Completion will be (increased) (decreased) by (number of days) days by this change order for a revised contract completion date of (revised completion date). (A detailed explanation for the change in construction duration is attached.)

Contractor Signature: _____

Date: _____

ACCEPTED:

Signature: _____

Date: _____

Distribution: Designer Owner Contractor

SECTION 01010

SUMMARY OF THE WORK

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

PROJECT/WORK IDENTIFICATION

General: Project name is "Fieldhouse Boiler Replacement Western Carolina University Cullowhee North Carolina, SCO Project 21-21229-01A", as shown on Contract Documents prepared by Sud Associates, P.A. Drawings are dated May 4, 2022.

Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project. Related requirements and conditions that are indicated on the Contract Documents include, but are not necessarily limited to, the following:

- Existing site conditions and restrictions on use of the site.
- Work performed prior to work under this Contract.
- Alterations and coordination with the existing building.
- Work to be performed concurrently by others.

Scope: A summary of the Scope of Work of this project is given after the table of contents.

Summary by References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, addenda and modifications to the contract documents issued subsequent to the initial printing of this project manual and including, but not necessarily limited to, printed material referenced by any of these. It is recognized that work of the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the contract documents.

CONTRACTOR USE OF PREMISES

General: The Contractor shall limit his use of the premises to the work indicated, to allow for Owner occupancy and use.

Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.

Keep existing driveways and entrances serving the premises, clear and available to the Owner and his employees, at all times. Do not use these areas for parking or storage of materials.

Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas indicated. If additional storage is necessary, obtain and pay for such storage off site.

Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, so as to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

Contractor Use of the Existing Building: Maintain the existing building in a safe and weather tight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

Smoking or open fires will not be permitted within the building enclosure or on the premises.

OWNER OCCUPANCY

Full Owner Occupancy: The Owner will occupy the site and the existing building during the entire period of construction. Cooperate fully with the Owner or his representative during construction operations to minimize conflicts and to facilitate Owner usage. Perform the work so as not to interfere with the Owner's operations.

DISCREPANCIES IN DRAWINGS AND SPECIFICATIONS

Should the Contractor find discrepancies or ambiguities in, or omissions from, the Drawings or Specifications, or should he be in doubt as to their meaning, he shall at once notify the Engineer, who will issue an interpretation.

ALTERATIONS AND COORDINATION

General: The work of this Contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from beginning of construction activity through project closeout and warranty periods.

Electrical Requirements: Except as otherwise indicated, comply with applicable provisions of The National Electrical Code (NEC) and standards by National Electrical Manufacturer's Association (NEMA), for electrical components of general work. Provide Underwriters Laboratories listed and labeled products where applicable.

COMPLIANCE WITH FEDERAL AND STATE LAWS AND REGULATIONS

General: Contractor including his subcontractors shall comply with all applicable federal, state and local laws and regulations.

Administrative Requirements: The Contractor shall provide any documents required to comply with administrative and legal requirements. These include summary reports of sales tax and other assessments, as requested by the Owner, etc.

Permits: The Contractor shall obtain all necessary permits and approvals required to perform the work. These permits and approvals shall be provided at no cost to the Owner.

Inspection Certificates: It shall be the responsibility of the Contractor to request and coordinate inspections. Obtain all inspection certificates required by law, ordinances, rules and regulations of the Authorities having jurisdiction. Provide to the Engineer certificates of such inspections; pay all fees, charges, and other expenses in connection therewith, prior to final payment.

Final payment will be made within thirty (30) consecutive days after acceptance of the work and the submission of notarized contractor's affidavit and letter certifying that no hazardous materials were introduced. The contractor's affidavit shall state: "This is to certify that all costs of materials, equipment, labor, and all else entering into the accomplishment of this contract, including payrolls, have been paid in full." The contractor's certification letter shall state: "This is to certify that no hazardous materials, including lead, asbestos, or PCB's were introduced into the building during the course of this project. If it is discovered at a later date that an asbestos-containing product was used, (name of contractor) will remove it and restore the project to its original working condition at no cost to the Owner."

SPECIAL REQUIREMENT

Interruption of Utilities: The buildings will be occupied during construction. Any interruption of utilities (electricity, water, heating, cooling, etc.) shall be minimized and undertaken through the owner with at least 72 hours advanced notice. If necessary, work must be done at night, or over the weekend, or during holidays to minimize interruptions. No extra payment will be made for such work.

Access to Buildings: The owner will make necessary arrangements for access to the premises. Coordinate with the Owner for all locked areas. It is the Contractor's responsibility to see that no un-authorized person gains access to construction areas. The Contractor shall coordinate with the Owner if access is required beyond normal working hours.

Employee Conduct: At any time during the construction and completion of the work covered by these specifications, if the conduct of any workman of the various crafts be adjudged ungentlemanly and a nuisance to the Owner or Engineer or if any workman be considered incompetent or detrimental to the work, the Contractor shall order such parties removed immediately from the grounds.

EXAMINATION OF PREMISES

Each Bidder prior to submitting a proposal shall examine the site and all conditions thereon. All proposals will be presumed to include all such existing conditions as may affect any work of this project; and failure to familiarize himself with any such conditions will in no way relieve the successful bidder from the necessity of furnishing all materials or performing any work that may be required to complete the work in accordance with the drawings and specifications, without additional cost to the Owner. Examination of premises shall be scheduled, by prior appointment only, with:

Don Hair
WCU Facilities Management
3476 Old Cullowhee Road
Cullowhee, NC 28723
(828) 227-7442(p) (828) 227-7198 (f)

CORRESPONDENCE TO THE OWNER AND ENGINEER

All papers required to be delivered to the Owner shall, unless otherwise directed in writing to the Contractor, be delivered to Sud Associates, P.A., 90 Southside Avenue, Suite 300 Asheville, North Carolina, 28801 and owner,

Don Hair
WCU Facilities Management
3476 Old Cullowhee Road
Cullowhee, NC 28723
(828) 227-7442(p) (828) 227-7198 (f)

PARKING REQUIREMENT

The contractor shall consult with the Owner for permissible parking locations and at all times shall endeavor to permit normal movement of vehicle and pedestrian traffic near the job site. The Contractor shall also coordinate with the Owner for location of site trailer if one is required.

THE CONTRACT DOCUMENTS

The Contract Documents consist of Notice to Bidders, Standard General Conditions of the Construction Contract, Supplementary General Conditions, all sections of Division 1, the Drawings, and Specifications,

including all bulletins, addenda, or other modifications of the Drawings and Specifications incorporated into the documents prior to their execution, the Proposal Form and supporting information submitted by the Contractor, the Contract Form, Power of Attorney, and Insurance Certificates evidencing the needed coverage's. All these items together form the Contract Documents. The contract will be awarded to the lowest responsible bidder for the entire work covered under this contract. Summary reports of sales tax and other assessments, as requested by the Owner, shall be provided.

END OF SECTION 01010

SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK

Minimum administrative and supervisory requirements necessary for coordination of work on the project include but are not necessarily limited to the following:

- Coordination and meetings
- Administrative and supervisory personnel
- Limitations for use of site
- Special reports
- General installation provisions
- Cleaning and protection
- Conservation and salvage

LIMITATIONS ON USE OF THE SITE

General: Limitations on site usage as well as specific requirements that impact site utilization are indicated on the drawings and by other contract documents. In addition to these limitations and requirements, administer allocation of available space equitably among entities needing both access and space so as to produce the best overall efficiency in performance of the total work of the project. Schedule deliveries so as to minimize space and time requirements for storage of materials and equipment on site.

Burial of Waste Materials: Do not dispose of organic and hazardous materials on site, either by burial or by burning.

Disposal: Owner shall identify any demolished items removed from the structures that he wants to retain. All such items shall be delivered to Owner in accordance with his instructions. Contractor shall remove from site all other demolished items (i.e. mechanical equipment, lighting fixtures, wire, etc.) Removed from the structures and dispose of them by legal means. The Contractor will assume full liability for the disposal of all demolished items removed from the site.

SPECIAL REPORTS

General: Submit special reports directly to the Owner within one day of an occurrence. Submit a copy of the report to the Designer and other entities that are affected by the occurrence.

Reporting Unusual Events: When an event of an unusual and significant nature occurs at the site, prepare and submit a special report. List chain of events, persons participating, response by the Contractor's personnel, an evaluation of the results or effects and similar pertinent information. Advise the Owner in advance when such events are known or predictable.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

Installer's Inspection of Conditions: Require the Installer of each major unit of work to inspect the substrate to receive work and conditions under which the work is to be performed. The Installer shall report all unsatisfactory conditions in writing to the Contractor. Do not proceed with the work until satisfactory conditions have been corrected in a manner acceptable to the Installer.

Manufacturer's Instructions: Where installations include manufactured products, comply with the manufacturer's applicable instructions and recommendations for installation, to the extent that these instructions and recommendations are more explicit or more stringent than the requirements indicated in the contract documents.

Inspect each item of materials or equipment immediately prior to installation. Reject damaged and defective items.

Provide attachment and connection devices and methods for securing work. Secure work true to line and level, and within recognized industry tolerances. Allow expansion and building movement. Provide uniform joint width in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable visual-effect choices to the Owner for final decision.

Recheck measurements and dimensions of the work, as in integral step of starting each installation.

Install each unit-of-work during weather conditions and project status which will ensure the best possible results in coordination with the entire work. Isolate each unit of work from incompatible work as necessary to prevent deterioration.

Coordinate enclosure of the work with required inspections and tests, so as to minimize the necessity of uncovering work for that purpose.

Mounting Heights: Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to the Designer for final decision.

CLEANING AND PROTECTION OF EXISTING AND NEW WORK

General: During handling and installation of work at the project site, clean and protect work in progress and adjoining work on the basis of continuous maintenance. Apply protective covering on installed work where it is required to ensure freedom from damage or deterioration at time of substantial completion. Clean and perform maintenance on installed work as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

Limiting Exposures of Work: To the extent possible through reasonable control and protection methods, supervise performance of the work in such a manner and by such means which will ensure that none of the work, whether completed or in progress, will be subjected to harmful, dangerous or otherwise deleterious exposure during the construction period. Such exposures include, where applicable, but not by way of limitation the following:

- Excessive static or dynamic loading
- Excessive internal or external pressures
- Excessively high or low temperatures
- Thermal shock
- Excessively high or low humidity
- Air contamination or pollution

Water or ice
Solvents
Chemicals
Light
Radiation
Puncture
Abrasion
Heavy traffic
Soiling
Bacteria
Insect infestation
Combustion
Electrical current
High speed operation, improper lubrication, unusual wear or other misuse
Incompatible interface
Destructive testing
Misalignment
Excessive weathering
Unprotected storage
Improper shipping or handling
Theft
Vandalism

END OF SECTION 01040

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF REQUIREMENTS

Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition.

"Cutting and patching" is performed for coordination of the work, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this definition. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.

Unless otherwise specified requirements of this section apply to Mechanical and Electrical work. Refer to Division 23 and 26 sections for additional requirements and limitations on cutting and patching of Mechanical and Electrical work.

QUALITY ASSURANCE

Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of load-carrying capacity or of load-deflection ratio.

Before cutting and patching the following categories of work, obtain the Designer's approval to proceed with cutting and patching as described in the procedural proposal for cutting and patching.

Structural steel

Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories of work

Structural concrete

Miscellaneous structural metals, including lintels, equipment supports, Stair systems and similar categories of work

Foundation construction

Bearing and retaining walls

Structural decking

Exterior wall construction

Piping, ductwork, vessels and equipment

Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the Designer's opinion, result in lessening the building's aesthetic qualities. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work. Remove and replace work judged by the Designer to be cut and patched in a visually unsatisfactory manner.

SUBMITTALS

Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this work well in advance of the time work will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:

Describe nature of the work and how it is to be performed, indicating why cutting and patching cannot be avoided. Describe anticipated results of the work in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.

List products to be used and firms that will perform work.

Give dates when work is expected to be performed.

List utilities that will be disturbed or otherwise be affected by work, including those that will be relocated and those that will be out-of-service temporarily. Indicate how long utility service will be disrupted.

Where cutting and patching of structural work involves the addition of reinforcement, submit details and engineering calculations to show how that reinforcement is integrated with original structure to satisfy requirements.

Approval by the Designer to proceed with cutting and patching work does not waive the Designer's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

PART 2 - PRODUCTS

MATERIALS

General: Except as otherwise indicated, or as directed by the Designer, use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 - EXECUTION

INSPECTION

Before cutting, examine the surfaces to be cut and patched and the conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.

Before the start of cutting work, meet at the work site with all parties involved in cutting and

patching, including mechanical and electrical trades. Review areas of potential interference and conflict between the various trades. Coordinate layout of the work and resolve potential conflicts before proceeding with the work.

PREPARATION

Temporary Support: To prevent failure provide temporary support of work to be cut.

Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Take precautions not to cut existing pipe, conduit or duct serving the building but scheduled to be relocated until provisions have been made to bypass them.

PERFORMANCE

General: Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Designer, proceed with cutting and patching at the earliest feasible time and complete work without delay.

Cutting: Cut the work using methods that are least likely to damage work to be retained or adjoining work. Where possible review proposed procedures with the original installer; comply with original installer's recommendations.

In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.

Where feasible, inspect and test patched areas to demonstrate integrity of work. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

CLEANING

Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely point, 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 01090

DEFINITIONS AND STANDARDS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification Sections, apply to work of this section.

DESCRIPTION OF REQUIREMENTS

General: This section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include obtaining permits, licenses, inspections, releases and similar documentation, as well as payments, statements and similar requirements associated with regulations, codes and standards. The term "Regulations" is defined to include laws, statutes, ordinances and lawful orders issued by governing authorities, as well as those rules, conventions and agreements within the construction industry which effectively control the performance of the Work regardless of whether they are lawfully imposed by governing authority or not.

Governing Regulations: Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations.

DEFINITIONS

Owner: The State of North Carolina through Western Carolina University, Cullowhee, North Carolina.

Designer or Engineer: The term "Designer" or "Engineer" refers to Sud Associates, P.A., 90 Southside Avenue, Suite 350, Asheville, North Carolina, 28801 and specifically the Design Engineer of Record as indicated by a Professional Engineering Seal affixed to the contract documents or duly appointed representative under the Engineer's responsible charge.

Contractor: The corporation, company, partnership, or individual who has entered into contract for the performance of the work covered by the drawings and specifications and is liable for the payment of a legal debt pertaining to the work.

General Explanation: Certain terms used in contract documents are defined in this article. Definitions and explanations contained in this section are not necessarily complete but are general for the Work to the extent that they are not stated more explicitly in another element of the contract documents.

General Requirements: Provisions and requirements of other Division-1 sections apply to the entire work of the Contract and, where so indicated, to other elements which are included in the project.

Indicated: The term "indicated" is a cross-reference to graphic representations, notes or schedules on the drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in contract documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader locate the cross-reference, and no limitation of location is intended except as specifically noted.

Directed, Requested, etc.: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by the Designer," "requested by the Designer," and

similar phrases. However, no such implied meaning will be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.

Approve: Where used in conjunction with the Engineer's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the term "approved" will be held to limitations of the Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will the Engineer's approval be interpreted as a release of the Contractor from responsibilities to fulfill requirements of contract documents or acceptance of the Work, unless otherwise provided by requirements of the contract documents.

"Work" or "Project": The work shown in the Drawings and specified herein.

Project Site: The term "project site" means the space available to the Contractor for performance of the Work, either exclusively or in conjunction with others performing other construction as part of the project. The extent of the project site is shown on the drawings.

Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations."

Install: The term "install" is used to describe operations at project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations".

Provide: The term "provide" means "to furnish and install, complete and ready for the intended use".

Installer: The "installer" is "the entity" (person or firm) engaged by the Contractor, its subcontractor or sub-subcontractor for performance of a particular element of construction at the project site, including installation, erection, application and similar required operations. It is a requirement that installers are experienced in the operations they are engaged to perform.

Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests of the Work, either at the project site or elsewhere, and to report, and (if required) interpret results of those inspections or tests. Approved testing laboratories are those accredited by the NCBCC to label electrical and mechanical equipment.

SPECIFICATION FORMAT AND CONTENT EXPLANATION

General: This article is provided to help the user of these specifications more readily understand the format, language, implied requirements and similar conventions of content. None of the following explanations shall be interpreted to modify the substance of contract requirements.

Production Methods: Portions of these specifications have been produced by editing master specifications; they may contain minor deviations from traditional writing formats. Such deviations are a natural result of this production technique, and no other meaning shall be implied.

Specification Format: These specifications are organized based upon the Construction Specifications Institute's 16-Division format. The organization of these specifications into Divisions, Sections or Trade Headings conforms generally to recognized industry practice.

Specification Content: This project specification has been produced employing certain conventions in the use of language as well as conventions regarding the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

In certain circumstances, language used in specifications and other contract documents is of the abbreviated type. Implied words and meanings will be appropriately interpreted.

Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where the full context of the contract documents so indicates.

Imperative Language is used generally in the specifications. Requirements expressed imperatively are to be performed by the Contractor. At certain locations in the text, for clarity, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when so noted. Methods of Specifying: Techniques or methods of specifying requirements vary throughout the text. The method used for specifying one element of the Work has no bearing on requirements for other elements of the Work.

Assignment of Specialists: In certain circumstances, the specification requires or implies that specific elements of the Work are to be assigned to specialists who must be engaged to perform that element of the Work. Such assignments are special requirements over which the Contractor has no choice or option. They are intended to establish which party or entity involved in a specific element of the Work is considered as being sufficiently experienced in the indicated construction processes or operations to be recognized as "expert" in those processes or operations. Nevertheless, the ultimate responsibility for fulfilling all contract requirements remains with the Contractor. These requirements should not be interpreted to conflict with the enforcement of building codes and similar regulations governing the Work. They are also not intended to interfere with local trade union jurisdictional settlements and similar conventions.

Trades: The use of certain titles such as "carpentry" in the specifications, is not intended to imply that the Work must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also is not intended to imply that the requirements specified apply exclusively to tradespersons of that corresponding generic name.

DRAWING SYMBOLS

General: Except as otherwise indicated, graphic symbols used on the drawings are those symbols recognized in the construction industry for purposes indicated.

Mechanical/Electrical Drawings: Graphic symbols used on mechanical and electrical drawings are generally aligned with symbols recommended by ASHRAE. Where appropriate, these symbols are supplemented by more specific symbols as recommended by other technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to the Engineer for clarification before proceeding.

INDUSTRY STANDARDS

Applicability of Standards: Except where more explicit or stringent requirements are written into the contract documents, applicable construction industry standards have the same force and effect as if bound into or copied directly into the contract documents. Such industry standards are made a part of the contract documents by reference. Individual specification sections indicate which codes and standards the Contractor must keep available at the project site for reference.

Referenced standards (standards referenced directly in the contract documents) take precedence over standards that are not referenced but generally recognized in the industry for applicability to the Work.

Unreferenced Standards: Except as otherwise limited by the contract documents, standards not referenced but recognized in the construction industry as having direct applicability will be enforced for performance of the Work. The decision as to whether an industry code or standard is applicable, or as to which of several standards are applicable, is the sole responsibility of the Designer.

Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with standard in effect as of date of contract documents.

Updated Standards: At the request of the Designer, Contractor or governing authority, submit a change order proposal where an applicable industry code or standard has been revised and reissued after the date of the contract documents and before the performance of the Work affected. The Designer will decide whether to issue a change order to proceed with the updated standard.

Conflicting Requirements: Where compliance with two or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the contract documents specifically indicate otherwise. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to the Designer for a decision before proceeding.

Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum to be provided or performed. Unless otherwise indicated, the actual Work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are minimum or maximum values, as noted, or as appropriate for the context of the requirements. Refer instances of uncertainty to the Designer for decision before proceeding.

Copies of Standards: The contract documents require that each entity performing work be experienced in that part of the Work being performed. Each entity is also required to be familiar with industry standards applicable to that part of the Work. Copies of applicable standards are not bound with the contract documents. Where copies of standards are needed for proper performance of the Work, the Contractor is required to obtain such copies directly from the publication source. Although copies of standards needed for enforcement of requirements may be required submittals, the Designer reserves the right to require the Contractor to submit additional copies as necessary for enforcement of requirements.

Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in the specifications or other contract documents they are defined to mean the recognized name of the trade association, standards generating organization, governing authority or other entity applicable to the context of the text provision. Refer to the "Encyclopedia of Associations", published by Gale Research Co., available in most libraries.

Federal Government Agencies: Names and titles of federal government standard or specification producing agencies are frequently abbreviated. The following acronyms or abbreviations as referenced in the contract documents indicate names of standard or specification producing agencies of the federal government. Names and addresses are subject to change but are believed to be, but are not assured to be, accurate and up-to-date as of the date of the contract documents.

- CFR Code of Federal Regulations
Available from the Government Printing Office
North Capitol Street
between G and H Streets NW
Washington, DC 20402 (202) 783-3238
(Material is usually first published in the Federal Register)

- CPSC Consumer Product Safety Commission
1111 Eighteenth Street NW
Washington, DC 20207 (202) 634-7700

- CS Commercial Standard (U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 377-2000

- DOT Department of Transportation
400 Seventh Street SW
Washington, DC 20590 (202) 426-4000
- EPA Environmental Protection Agency
401 M Street SW
Washington, DC 20460 (202) 829-3535
- FCC Federal Communications Commission
1919 M Street NW
Washington, DC 20554 (202) 632-7000
- FS Federal Specification
(General Services Administration)
Specifications Unit (WFSIS)
7th and D Streets SW
Washington, DC 20406 (202) 472-2205 or 472-2140
- MIL Military Standardization Documents
(U.S. Department of Defense)
Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120
- NBS National Bureau of Standards
(U.S. Department of Commerce)
Gaithersburg, MD 20234 (301) 921-1000
- OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
Washington, DC 20402 (202) 783-3238
- PS Product Standard of NBS
(U.S. Department of Commerce)
Government Printing Office
Washington, DC 20402 (202) 783-3238
- USPS U.S. Postal Service
475 L'Enfant Plaza SW
Washington, DC 20260 (202) 245-4000

SUBMITTALS

Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

THIS LIST IS PROVIDED FOR GENERAL REFERENCE ONLY. THIRD PARTY AGENCIES THAT LABEL ELECTRICAL & MECHANICAL EQUIPMENT AS OF JULY 1, 2001

Applied Research Laboratories
5371 Northwest 161st Street
Miami, Florida 33014
(305) 624-4800

Equipment Categories: 6, 8, 12
14, 15, 16, 18, 21, 22, 24, 31 and 43

CSA International
178 Rexdale Boulevard, Etobicoke
Ontario, Canada M9W IR3
(416) 747-4000
Entela, Inc.
3033 Madison Avenue SE
Grand Rapids, Michigan 49548
(616) 247-0515

All Equipment Categories

Equipment Categories: 11, 12, 26, 27,
28, 29, 31, 40, 43, 47 and 48

Factory Mutual Research
P.O. Box 9102
Norwood, Massachusetts 02062
(781) 762-4850

Equipment Categories: 5, 9, 17
19, 24, 28, 31, 32, 43, 47, and 51

Intertek Testing Services ITS-ETL
3933 US Route 11
Cortland, New York 13045
(607) 753-6711

All Equipment Categories Except 21

Intertek Testing Services ITS-Warnock
3933 US Route 11
Cortland, New York 13045-0950
(607) 753-6711

Equipment Categories: 17, 18, 21
and 25

MET Laboratories, Inc.
2200 Gateway Centre Blvd. /Suite 215
Morrisville, North Carolina 27560
(919) 481-9319

Equipment Categories: 7, 10-16, 18,
22, 23, 26-31, 37-40, 40-43, 44, 47,
48 and 50

Omni-Test Laboratories
P.O. Box 743
Beaverton, Oregon 97075
(503) 643-3788

Equipment Categories: 17, 18 & 21

PFS Corporation
2402 Daniels Street
Madison, Wisconsin 53718
(608) 221-3361

Equipment Categories: 17, 19, 20
21, and replacement blowers & coils

RADCO
3220 East 59th Street
Long Beach, California 90805
(310) 272-7231

Equipment Categories: 17, 18, and
replacement blowers and coils

TUV Rheinland of North America
762 Park Avenue
Youngsville, North Carolina 27596

Equipment Categories 7, 8, 9, 11-14,
16, 26, 27, 28, 31, 40, 43, 47 and 48

(919) 872-3316

Underwriters Laboratories, Inc.
12 Laboratory Drive
Research Triangle Park, North Carolina 27709
(919) 549-1400

All Equipment Categories

EQUIPMENT CATEGORIES

1. Conductors for General Wiring
2. Flexible Cords
3. Wires and Cables for Special Applications
4. Materials and Components for Special Applications
5. Alarm Signal and Detecting System Components
6. CATV and Radio Distribution System Components
7. Communication System Components
8. Radio and Television Components
9. Energy Management System Components and Controllers
10. Sound Recording and Reproduction Equipment
11. Fixed Office Appliances and Business Equipment
12. Electrical Appliances
13. Electric Space heating Equipment and Accessories
14. Air Conditioning Equipment and Accessories
15. Heat Pump Equipment and Accessories
16. Refrigeration Equipment and Accessories
17. Gas Fired Heating Equipment and Accessories
18. Gas Fired Appliances
19. Oil Fired Heating Equipment and Accessories
20. Oil Fired Appliances
21. Solid Fuel Heating Equipment
22. Fans and Ventilators
23. Filtering Equipment
24. Duct Materials Including Dampers
25. Chimneys and Vents
26. Electrical Data Processing Equipment
27. Medical, Dental, and X-Ray Equipment
28. Laboratory, Equipment, Electrical Measuring, and Testing Equipment
29. Food Preparation Machines
30. Swimming Pool and Spa Equipment
31. Miscellaneous Fixed Equipment – Amusement Machines, Animal Care, Appliances Battery Chargers, Cleaning Machines, etc.
32. Fire Extinguishing Equipment
33. Circuit Breakers
34. Fuses
35. Wiring Devices, Attachment Plugs and Toggle Switches
36. Switches and Switching Devices – Other than Toggle
37. Panelboards
38. Switchboards
39. Transformers
40. Electrical Signs and Accessories
41. Ground-Fault Circuit Interrupters
42. Ground-Fault Sensing and Relaying Equipment

43. Industrial Control Equipment – Motor Controllers, Industrial Control Panels, Motor Control Centers, Motorized Valves, Solenoids, etc.
44. Transient Voltage Surge Suppressors and Filters
45. Lightning Protection System Components and Lightning Protection Devices
46. Metering Enclosures and Meter Sockets
47. Emergency Lighting and Power Equipment System Components
48. Lighting Fixtures, Lamp Holders, and Accessories
49. Auxiliary Gutters, Junction, Pull and Outlet Boxes, and Cabinets and Cutout Boxes
50. Electrical Equipment for Hazardous Locations
51. Grounding and Bonding Equipment
52. Wire Connectors, Lugs, and Terminal Fittings
53. Insulating Tape and Closures

END OF SECTION 01090

SECTION 01631

PRODUCTS AND SUBSTITUTIONS

PART 1 - GENERAL

RELATED DOCUMENTS

Drawings, Notice to Bidders and Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF REQUIREMENTS

Definitions: Definitions used in this paragraph are not intended to negate the meaning of other terms used in the contract documents, including such terms as, "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction" and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.

"Products" are items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the project or taken from the Contractor's previously purchased stock. The term "product" as used herein includes the terms "material," "equipment," "system" and other terms of similar intent.

"Named Products" are products identified by use of the manufacturer's name for a product, including such items as a make or model designation, as recorded in published product literature, of the latest issue as of the date of the contract documents.

"Materials" are products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form units of work.

"Equipment" is defined as a product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.

Substitutions: The Contractor's requests for changes in the products, materials, equipment and methods of construction required by the contract documents are considered requests for "substitutions," and are subject to the requirements specified herein. The following are not considered as substitutions:

Revisions to the contract documents, where requested by the Owner or Engineer are considered as "changes" not substitutions.

Substitutions requested during the bidding period, which have been accepted prior to the Contract Date, are included in the contract documents and are not subject to the requirements for substitutions as herein specified.

Specified Contractor options on products and construction methods included in the contract documents are choices available to the Contractor and are not subject to the requirements for substitutions as herein specified.

Except as otherwise provided in the contract documents, the Contractor's determination of and compliance with governing regulations and orders as issued by governing authorities do not constitute "substitutions" and do not constitute a basis for change orders.

Standards: Refer to Division-1 section "Definitions and Standards" for the applicability of industry standards to the products specified for the project, and for the acronyms used in the text of the specification sections.

QUALITY ASSURANCE

Source Limitations: To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work.

Compatibility of Options: Compatibility of products is a basic requirement of product selection. When the Contractor is given the option of selecting between two or more products for use on the project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to the Contractor is not assured by the various requirements of the Contract documents but must be provided by the Contractor.

SUBMITTALS

Product Listing Submittal:

General: Prepare a product-listing schedule in a form acceptable to the Designer. Show names of the principal products required for the work, by generic name. Show proprietary product names and the name of the manufacturer for each item listed that is to be purchased and incorporated into the Work.

Refer to Division 26 sections for a special separate listing of products required for Direct Digital Control work.

Form: Prepare the product-listing schedule with information on each item tabulated under the following scheduled column headings:

- Generic name as used in contract documents
- Proprietary name, model number and similar product designation
- Manufacturer's and supplier's name and city-state addresses
- Related unit-of-work specification section number
- Installer's name and primary trade of workmen
- Projected delivery date, or time span of delivery period

Submittal: Submit an electronic copy of the product-listing schedule within 20 days after the date of award of contract. Provide a written explanation for omissions of data, and for known variations from contract requirements.

Designer's Action: The Designer will respond to the Contractor in writing within two (2) weeks of receipt of the product-listing schedule. No response by the Designer within the 2-week time period constitutes no objection to the listed products or manufacturers, but does not constitute a waiver of the requirement that products comply with the requirements of the contract documents. The Designer's response will include the following:

The Designer's listing of unacceptable product selections, if any, containing an explanation of the reasons for this action.

A request for additional data necessary for the review and possible acceptance of the products and manufacturer's listed.

Substitution Request Submittal:

Requests for Substitutions: Submit all requests for substitutions at least 10 days prior to the opening of bids. Submit 3 copies of each request for substitution. In each request identify the product or fabrication or installation method to be replaced by the substitution; include related specification section and drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include

the following information, as appropriate, with each request:

Provide complete product data, drawings and descriptions of products, and fabrication and installation procedures.

Provide samples where applicable or requested.

Provide a detailed comparison of the significant qualities of the proposed substitution with those of the work originally specified. Significant qualities include elements such as size, weight, durability, performance, and visual effect where applicable.

Provide complete coordination information. Include all changes required in other elements of the work to accommodate the substitution, including work performed by the Owner and separate Contractors.

Provide a statement indicating the effect the substitution will have on the work schedule in comparison to the schedule without approval of the proposed substitution. Include information regarding the effect of the proposed substitution on the Contract Time.

Provide certification by the Contractor to the effect that, in the Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal-to or better than the work required by the Contract documents, and that it will perform adequately in the application indicated.

Include in this certification, the Contractor's waiver of rights to additional payment or time, which may subsequently be necessary because of the failure of the substitution to perform adequately.

Designer's Action: Within one week of receipt of the Contractor's request for substitution, the Designer will request additional information or documentation as may be needed for evaluation of the request. Within 2 weeks of receipt of the request, or within one week of receipt of the requested additional information or documentation, whichever is later, the Designer will notify the Contractor of either the acceptance or rejection of the proposed substitution.

Rejection will include a statement giving reasons for the rejection.

PRODUCT DELIVERY, STORAGE, AND HANDLING

General: Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Control delivery schedules to minimize long-term storage at the site and to prevent overcrowding of construction spaces. Coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

Deliver products to the premises in the manufacturer's sealed container or other packaging system, complete with labels and instructions for handling, storage, unpacking, protecting, and installing. Owner's personnel will not accept delivered materials - arrangements must be made by Contractor concerned to have Contractor's own personnel accept all deliveries of construction materials.

Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

Store heavy materials away from the project structure in a manner that will not endanger the supporting construction.

PART 2 – PRODUCTS

GENERAL PRODUCT COMPLIANCE

General: Requirements for individual products are indicated in the contract documents; compliance with these requirements is in itself a contract requirement. These requirements may be specified in any one of several different specifying methods, or in any combination of these methods. These methods include the following:

- Proprietary
- Descriptive
- Performance
- Compliance with Reference Standards

Compliance with codes, compliance with graphic details, allowances, and similar provisions of the contract documents also have a bearing on the selection process.

Procedures for Selecting Products: The Contractor's options in selecting products are limited by requirements of the contract documents and governing regulations. They are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects. Required procedures include but are not limited to the following for the various indicated methods of specifying:

Proprietary and Semiproprietary Specification Requirements:

Three or More Product Names: Where three or more products or manufacturers are named, provide one of the products named, at the Contractor's option. Exclude products that do not comply with specification requirements. In accordance with the Supplementary General Conditions submit all requests for substitutions prior to the opening of bids. Do not provide or offer to provide an unnamed product that was not approved prior to the opening of bids. Advise the Designer before proceeding where none of the named products comply with specification requirements or are feasible for use.

Where products or manufacturers are specified by name, accompanied by the term "or-equal" or similar language, comply with the contract document provisions concerning "substitutions" to obtain approval from the Designer prior to the opening of bids for the use of an unnamed product.

Non-Proprietary Specification Requirements: Where the specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to the use of these products only, the Contractor may, at his option, use any available product that complies with contract requirements.

Descriptive Specification Requirements: Where the specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand or trade name, provide products or assemblies that provide the characteristics indicated and otherwise comply with contract requirements.

Performance Specification Requirements: Where the specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer's recommendations may be contained in published product literature, or by the manufacturer's individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.

Compliance with Standards, Codes and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes, and regulations. The burden of proof-of-compliance is on the Contractor.

Visual Matching: Where matching an established sample is required, the final judgment of whether a product proposed by the Contractor matches the sample satisfactorily will be determined by the Designer. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of the contract documents concerning "substitutions" and "change orders" for the selection of a matching product in another product category, or for non-compliance with specified requirements.

Visual Selection: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, the Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. The Designer is subsequently responsible for selecting the color, pattern and texture from the product line selected by the Contractor.

Producer's Statement of Applicability: Where individual specification sections indicate products that require a "Statement of Applicability" from the manufacturer or other producer, submit a written-certified statement from the producer stating that the producer has reviewed the proposed application of the product on the project. This statement shall state that the producer agrees with or does not object to the Designer's specification and the Contractor's selection of the product for use in the Work. The statement shall also state that the proposed application of the product on the project is suitable and proper.

SUBSTITUTIONS

Conditions: Before the Bid Opening in accordance with the Supplementary General Conditions, the Contractor's request for a substitution will be received and considered when extensive revisions to the contract documents are not required, when the proposed changes are in keeping with the general intent of the contract documents, when the requests are timely, fully documented and properly submitted, and when one or more of the following conditions is satisfied, all as judged by the Designer; otherwise the requests will be returned without action except to record non-compliance with these requirements.

The Designer will consider a request for substitution where the request is directly related to an "or equal" clause or similar language in the contract documents.

The Designer will consider a request for substitution where the specified product or method cannot be provided within the Contract Time. However, the request will not be considered if the product or method cannot be provided as a result of the Contractor's failure to pursue the work promptly or to coordinate the various activities properly.

The Designer will consider a request for substitution where the specified product or method cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

The Designer will consider a request for a substitution where a substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to the Designer for redesign and evaluation services, the increased cost of other work by the Owner or separate contractors, and similar considerations.

The Designer will consider a request for substitution when the specified product or method cannot be provided in a manner which is compatible with other materials of the work, and where the Contractor certifies that the substitution will overcome the incompatibility.

The Designer will consider a request for substitution when the specified product or method cannot be properly coordinated with other materials in the work, and where the Contractor certifies that the proposed substitution can be properly coordinated.

The Designer will consider a request for substitution when the specified product or method cannot receive a warranty as required by the contract documents and where the contractor certifies that the proposed substitution receive the required warranty.

Work-Related Submittals: The Contractor's submittal of and the Designer's acceptance of shop drawings, product data or samples which relate to work not complying with requirements of the contract documents, does not constitute an acceptable or valid request for a substitution, nor approval thereof.

GENERAL PRODUCT REQUIREMENTS

General: Provide products that comply with the requirements of the Contract documents and that are undamaged and, unless otherwise indicated, unused at the time of installation. Provide products that are complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

Standard Products: Where they are available, provide standard products of types that have been produced and used in similar situations on other projects.

Continued Availability: Where, because of the nature of its application, the Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard, domestically produced products for which the manufacturer has published assurances that the products and its parts are likely to be available to the Owner at a later date.

Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.

Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface which, in occupied spaces, is not conspicuous.

Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate the nameplate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.

- Name of manufacturer
- Name of product
- Model number
- Serial number.
- Capacity
- Speed
- Ratings
- U.L. listed label on all electrical equipment

PART 3 - EXECUTION

INSTALLATION OF PRODUCTS

General: Except as otherwise indicated in individual sections of these specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other work. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.

END OF SECTION 01631

SECTION 22 01 10 - PLUMBING GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 REFERENCES & INTENT

- A. All work of this Division shall comply with the requirements of Division 1.
- B. Study all drawings and specifications before submitting bids.
- C. Work under this Division includes all essential labor, materials, tools, equipment, transportation, insurance, temporary protection, supervision and incidental items for proper installation and operation of all systems even though not specifically mentioned or indicated.
- D. Field verify all building dimensions. The drawings are not to be scaled for final dimensions. However, the equipment is to be installed substantially as shown.
- E. It is the intent of these specifications and drawings to provide for finished systems of the quality specified, properly tested, balanced and ready for operation. This includes all devices and accessories required to make the work complete even though such items may not be expressly shown or specified. Drawings and specifications are complementary and must be so construed to determine the full scope of work.
- F. Job site Conditions: The Contractor shall visit the site and familiarize himself with the existing conditions before submitting this bid. Failure to do so does not relieve the Contractor from completing the work as specified herein and after. Requests for additional payments due to the Contractor's failure to allow for work conditions will be rejected.

1.2 WORK INCLUDED

- A. The following work is specifically included without limiting the generality implied by these specifications and drawings.
 - 1. All plumbing scope of work as specified herein and as shown on the plans.
 - 2. Work includes all piping, supports, anchors, insulation, labeling and identification.
 - 3. All associated cutting and patching.
- B. Bidders shall examine equipment plans and specifications and include in their bids all labor and material required for complete installation and connection of equipment which is properly a part of their trade even if it is not provided in the equipment specifications.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions, Division-1 Specification sections and other Division 22 specification sections, apply to work of this section.

1.4 STANDARDS AND CODES

- A. All equipment with electrical components shall bear the UL label.
- B. The following minimum standards apply wherever applicable:

AGA	American Gas Association, Inc.
ANSI	American National Standards Institute, Inc.
ANSI B 31.9	Building Services Piping Code
ASME/ASME Code Sec.9	American Society of Mechanical Engineers Boiler and Pressure Vessel Code-Welding and Brazing Qualifications
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
AWWA C651	Disinfecting Water Mains
NBFU	National Board of Fire Underwriters
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act
MSS	Manufacturer's Standardization Society of the Valves and Fittings Industry
UL	Underwriters laboratories, listed Product Directories
North Carolina Plumbing Code, 2002 – International Plumbing Code 2000	

- C. In the event there are conflicts between specifications and standards, or codes, standards or codes shall govern unless specifications are in excess of standards.

1.5 QUALITY ASSURANCE

- A. All work shall be accomplished in a neat, workmanlike manner by experienced journeymen.
- B. All work shall be performed at such times as are required by the progress of the job.
- C. Plumbing equipment and fixture installation shall be by a licensed plumber specializing in performing the work of this section with minimum 3 years experience.
- D. Materials and installation shall be in accordance with North Carolina State Building Code current edition.

1.6 PERMITS AND FEE

- A. Not used.

1.7 STRUCTURAL STEEL AND CONCRETE

- A. Structural members may not be pierced without prior written approval of the Engineer.

1.8 WATERPROOFING

- A. Waterproofed floors and walls may not be penetrated without prior written approval of the Engineer.

1.09 WORK SCHEDULE

- A. Work schedule shall be in accordance with Division 1.

1.10 PROTECTION OF EQUIPMENT

- A. Provide all necessary protection and be fully responsible for material and equipment stored or installed on the site.

- B. Material or equipment stolen or damaged shall be replaced at no additional cost to the Owner.
- C. Provide protection against theft, physical damage and the entry of dirt, water, corrosive fumes into the material and equipment.
- D. Maintain protective covers for the duration of construction. Store equipment, such as controls, subject to damage by moisture and temperature extremes in a dry, heated space.

1.11 FIRE SAFETY

- A. Fire Watch: Provide a fire watch wherever welding, brazing, cutting or other processes involving an open flame or potential for generating sparks is used. Fire watch shall consist of a person with a 10-pound carbon dioxide fire extinguisher. While on fire watch, the person so assigned shall have no other duties or assignments.
- B. Fire Blanket: In addition to providing a fire watch, use an approved fire blanket to cover any combustible materials in the immediate area.
- C. A hot work permit must be secured from the Owner's Safety and Risk Management Department.

1.12 GUARANTEES

- A. Furnish written guarantee, 1 year labor and materials, on all work in accordance with requirements of General Conditions. Partial approval of a portion of work does not affect the validity of guarantee.

1.13 SUBMITTALS

- A. It shall be noted that submittals processed by the Engineer are not change orders; that the purpose of submittals is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install, and by detailing the fabrication and installation methods he intends to use. If deviations, discrepancies or conflicts between submittals and the contract documents in the form of design drawing and specifications are discovered either prior to or after submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. The engineer may also require the contractor to submit samples of proposed or specified equipment for approval, with the samples to be returned to the contractor upon request.
- B. Prior to procurement or manufacturing, submit for approval appropriate shop drawings, manufacturer's catalog data, and/or descriptive literature giving performance data, physical size, wiring diagrams, configuration, capacity, installation instructions, dimensions including rough-in dimensions, pipe connection sizes, trim, and finishes material, etc., for all items under this Division.
- C. Field verify the characteristics of all specified equipment before preparing shop drawings. This shall include available space, available voltages, suitability of substrate for receiving the specified equipment, etc.
- D. Where different products have to work together, it is the contractor's responsibility to select manufacturers whose products are visually or technically compatible.

- E. Prepare listing of plumbing fixture, specialty items, and piping materials for the project. A sample schedule is included at the end of this section to complete this requirement. Provide all information represented. Plumbing materials shall not be delivered to the building until the Architect has inspected and approved the completed listing.

1.14 RECORD DOCUMENTS

- A. During construction, keep an accurate record of all changes and deviations from contract documents. Upon completion of this installation, the contractor shall submit to the Engineer maintenance manuals and marked up prints indicating any installed work that is different from what is shown on the drawings.

PART 2 - PRODUCTS

2.1 QUALITY OF MATERIAL

- A. Plumbing equipment manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum three years experience. Equipment of the same general type shall be of the same make. Brand names and catalog numbers included with equipment or material specifications are used to indicate quality, rating or operating characteristics of the equipment or material.
- B. All materials provided shall be new and shall be approved by the Underwriter's Laboratories, Inc. wherever that agency has applicable standards.

PART 3 - EXECUTION

3.1 CLEARANCE AND RESTORATION OF SITE

- A. It may be required to temporarily remove existing ceiling tiles, piping, duct, conduits, etc. to introduce new work as specified in this Division. Contractor, after installation of new work, shall reinstall, reconnect removed items to match the existing. Installation of any new equipment shall not compromise existing fire ratings of rated assemblies. All penetrations shall be sealed to existing conditions per ALL guidelines for penetration protections. Provide offsets if required in existing piping, ducts etc. to introduce new work.

3.2 COORDINATION

- A. Install all work to permit removal or maintenance of equipment and fixtures without damage to the equipment, fixtures, or the building.
- B. Verify equipment space requirements, condition of substrate, voltages, etc. at the time of shop drawing submission and advise the engineer of any conflict.
- C. Do not rough prior to receipt of approved shop drawings.

3.3 EQUIPMENT ARRANGEMENT AND SUPPORT

- A. Support plumb, rigid and true to line all work, including equipment, fixtures, and piping furnished under this Division. Study thoroughly architectural, mechanical drawings and all related drawings to determine how equipment, fixtures and piping are to be supported, mounted, or suspended.

- B. Provide extra steel bolts, inserts, pipe stands, brackets, and accessories for proper support as required whether or not shown on drawings. When directed, furnish for approval a drawing showing supports.

3.4 FINAL ADJUSTMENT AND TESTING

- A. General: Provide all testing, preliminary and final adjustment of instrumentation for this purpose. Conduct all tests in full compliance with applicable codes prior to covering or concealing work by insulation, enclosures, etc.
- B. Material found to be defective shall not be repaired. It shall be replaced with new material which tests satisfactorily. Defective workmanship only may be corrected after discovery of defect by tests.
- C. Working Tests: Subject all equipment and controls to simultaneous and continuous working tests for a period of one day prior to final inspection. Make adjustments, repairs and equipment replacements as required.

3.5 LABELS, IDENTIFICATION AND TAGS

- A. Label plumbing equipment and specialty items in conformance with Division 23 Section "Mechanical Painting and Identification".

3.6 IDENTIFICATION OF ABOVE CEILING EQUIPMENT

- A. Equipment, controls, valves, dampers and other devices needed service, adjustments or maintenance but located in concealed spaces and above the ceiling shall be marked on surfaces visible from floor.
- B. A small phenolic tag, plastic or clear tape label, or simple color dot sticker placed on ceiling grid at approximate location of the device shall be utilized.
- C. The selected marking scheme shall be coordinated with the Owner before implementation. The marking scheme shall be accompanied by a schedule or legend which shall be included in O&M manual and posted in mechanical room.

3.7 OWNER'S RIGHT TO TEST SYSTEMS

- A. Should, in the opinion of the Engineer, and during the guarantee period, reasonable doubt exist as to the proper functioning of any equipment installed under this Contract, the right is reserved for the Owner and Engineer to perform any test deemed practical to determine whether such equipment is functioning properly and performing at required capacity. If such tests show proper functioning, the cost of the test will be paid by the Owner. If the tests indicate a deficiency in equipment capacity or performance, the Contractor shall pay the cost of the test and also make good any deficiencies shown by the test to the full satisfaction of the Owner and the Engineer.

3.8 CLEANING UP

- A. The contractors performing work under this section shall at all times keep the premises and the building in a neat and orderly condition and any instructions of the Engineer in regard to the storing of material, protective measures, cleaning up of debris, etc. shall be explicitly followed. At the completion of the job, all equipment shall be cleaned to the satisfaction of the Owner.

- B. Buildings will be occupied during installation of the new addition and/or alterations as described hereinafter. Thus, special care shall be taken during installation to protect equipment and other furniture in the buildings from dust and debris generated during installation of work specified in this Division.

3.9 INSPECTION CERTIFICATES

- A. Obtain all inspections required by law, ordinances, rules, and regulations of the authorities having jurisdiction and obtain and furnish to the Engineer certificates of such inspections, pay all fees, charges, and other expenses in connection therewith.

3.10 FINAL REVIEW

- A. Final review and tests of the completed construction shall be performed in the presence of the Engineer or his representative and shall be at such times as are convenient to the Engineer.
- B. Final tests shall show conclusively that all fixtures and equipment perform their intended and specified functions and that all work complies with the provisions of these specifications.
- C. All material, equipment, and instruments required for the tests shall be furnished by the Contractor at his own expense.

END OF SECTION

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL REQUIREMENTS

1.1 WORK INCLUDED

- A. Provide insulation for piping and equipment installed under this contract, as indicated on the drawings and specified herein, including, but not limited to:
 - 1. Domestic hot and cold water piping, valves and fittings.
 - 2. Exposed drain and hot water piping below handicapped fixtures.

1.2 SUBMITTALS

- A. Submit manufacturer's product data on all insulation products specified, including thermal resistance values, flame and smoke ratings, UL listing, and manufacturers published installation recommendations.

1.3 GENERAL REQUIREMENTS

- A. For the purpose of this specification, the term "exposed" is generally intended to mean work that is visible in finished spaces and above lay-in tile ceilings. The term "concealed" is generally intended to mean work that is installed behind walls, plastered ceilings, and under floors.
- B. Where subject to freezing, cover piping and fittings with single piece, double the thickness normally specified.
- C. All insulation, jackets, adhesives, and other insulation materials shall be UL rated, non-combustible, with maximum permanent flame spread rating of 25, and a smoke developed rating of 50 or less and fuel contributed of 50 or less when tested in accordance with ASTM E-84. Submit smoke and flame spread ratings for every material proposed to use.
- D. Unless otherwise indicated, insulation thickness or "R" value shall conform to ASHRAE Standard 90-75, and the North Carolina State Building Code, Volume X - Energy.
- E. Where differences occur between any referenced standard or code the most stringent requirements shall apply.
- F. All products shall be free of asbestos.
- G. All insulation work shall be done by skilled tradesmen, normally employed in this field.

PART 2 - PRODUCTS

2.1 MATERIALS - GENERAL

- A. Type 1 - Fiberglass pipe insulation.
 - 1. Fiberglass sectional molded insulation, minimum density of 3.5 lb/cu.ft. with factory applied white vapor barrier jacket, .25 BTU/hr. /Sq. Ft. / Deg. F. / in. conductivity at 75 deg. F, conforming to ASTM C-547 67.
 - 2. The jacket shall be foil-scrim-kraft laminate. Jackets shall be vapor sealed with continuous self sealing lap strips. End joints shall be similarly sealed with factory

furnished butt strips with pressure sealing adhesive.

- a. Manufacturers:
 - (1) Johns Manville - J-M Flame safe AP
 - (2) PPG Industries
 - (3) Owens Corning
 - (4) Certainteed – Certablue
 - (5) Knauf
 3. Insulation for valves, fittings and unions shall be the same thickness as the pipe insulation by any of the following methods, including both insulation and cover.
 - a. Insulate with one pound per cubic foot density fiberglass blanket wrapped firmly under compression (minimum 2 to 1) and secure with number 20-gauge annealed steel wire.
 - b. Insulate with molded fiberglass fittings secured with number 20-gauge annealed steel wire.
 - c. Miter fiberglass piping insulation to form fittings, secured with number 20-gauge annealed steel wire. Use preformed angels where possible. Fiberglass batt type insulation shall NOT be used.
 - d. Cover with pre-molded one-piece PVC fitting covers secured by banding. If additional securing is required, taping and stapling may be used. Covers shall be sealed with vapor barrier pressure sensitive tape. Color to match cover.
 - e. Cover with a smooth coating of cement. Open weave glass fabric to be smoothly adhered and coated with lagging adhesive. Lap glass on fabric at least 1" on itself and 2" on adjoining pipe insulation.
 4. Seal all joints and seams with tape as recommended by manufacturer.
- B. Type 2 – Flexible Pipe Insulation
1. Material – Flexible, closed cell, elastomeric thermal insulation, minimum k value .27 at 75°F conforming to ASTM C 534.
 2. Fittings - Sleeve type fitting covers, and miter cut tubular form.
 3. Manufacturers:
 - a. Armstrong - Armaflex AP or Self Seal 2000
 - b. Johns Manville - Aerotube II
 - c. Rubatex No. R-180-J

2.2 FIELD APPLIED JACKETS

- A. Canvas Jacket: UL listed fabric, 8 oz/sq yd, plain weave cotton treated with dilute fire-retardant lagging adhesive.

PART 3 - EXECUTION

3.1 GENERAL

- A. Apply insulation in strict accordance with manufacturer's instructions.
- B. All surfaces must be free of dirt, dust, grease, oil, scale, or loose particles before insulation.
- C. Do not cover fittings until required tests have been completed and accepted.
- D. Insulation shall be continuous passing through walls. Size sleeves accordingly to accommodate insulation. Where insulation passes through floor or wall sleeves, pack

the space outside of the insulation and inside of the sleeve with fiberglass blanket. Seal with fire rated sealant on fired rated partitions.

- E. For cold lines for condensation protection or for safety protection of hot lines unions shall be insulated as follows:
 - 1. Covering shall be terminated at each end of the union and sealed.
 - 2. Cover union with separate section of insulation, routed out to fit over union, of section of pipe insulation whose inside diameter matches the outside diameter of the adjoining insulation, lap adjoining insulation on both sides by 3", seal vapor tight plastic tape.
- F. Patching: Where connections are made to existing piping patch all existing insulation to match existing.
- G. Provide insulation saddles and shields at hangers to prevent deformation or penetration of insulation by contact with hangers.
- H. Cover pipe with canvas jacket in all exposed locations.

3.2 DOMESTIC WATER PIPING

- A. Type 1- For cold water piping, 1/2 " thickness for all piping.
- B. Type 1- For hot water piping , 1" thickness for all piping.

END OF SECTION

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL REQUIREMENTS

1.1 WORK INCLUDED

- A. Provide domestic hot and cold water piping as indicated on the drawings and as specified herein, including;
 - 1. Pipe and fittings
 - 2. Valves
 - 3. Testing
 - 4. Potable water system sterilization.

1.2 CODES AND STANDARDS

- A. Comply with the provisions of the following codes and standards.
 - 1. North Carolina State and Building Code.
 - 2. Local codes, ordinances, and requirements.

1.3 SUBMITTALS

- A. Submit manufacturer's product data on pipe, valves and fittings.

PART 2 - PRODUCTS

2.1 WATER PIPING

- A. Above ground water piping shall be type "L" copper with solder joints. Solder for potable water systems shall be lead free, 95 /5 Tin/Antimony. Appropriate fittings shall be used for all turns, and joints.

2.2 ESCUTCHEONS

- A. Use chrome-plated flush escutcheons on ceiling and wall. At floors, use deep cup chrome-plated escutcheon. Escutcheons shall be used at all piping in finished areas. Escutcheons on insulated piping shall fit insulation tightly.

PART 3 - EXECUTION

3.1 PIPE AND FITTINGS INSTALLATION

- A. Changes in pipe sizes shall be made with reducing fittings.
- B. All uninsulated water piping exposed in finished rooms shall be chrome plated.
- C. Use dielectric connections for all joints of dissimilar metals. Protect insulating material if heat is applied to fitting.
- D. Make copper piping joints with 95-5 solder, and no corrosive solder paste. Flux and solder combinations are not permitted.
- E. Grade piping to low points and provide drain valves.

- F. Provide domestic water branch piping to fixtures and make final connections to fixtures provided by this or other contractors.
- G. Do not rough piping inside spaces, partitions, stud wall voids, plenums, or cavities subject to potential freezing.
- H. Provide valves at inlet and outlet of each piece of equipment, at each fixture, on branch lines and where indicated on the drawings.
- I. Provide escutcheons for exposed piping passing through walls, floors, or ceilings.

3.2 POTABLE WATER SYSTEM STERILIZATION

- A. All pipe and fittings connected to and forming a part of a potable water supply shall be sterilized. Sterilization shall be accomplished after the pipe has passed the hydrostatic pressure tests. The method used by the contractor shall be in full accordance with the requirements of the AWWA Specification C-601, and state and local Departments of Health.
- B. All new piping shall be filled with not less than 25, nor more than 50 parts per million (ppm) of available chlorine and held in contact with such for not less than 24 hours. Final tests after 24 hours shall show a minimum residual chlorine content of 25 ppm in all parts of the system. All chlorine introduced into the system shall be totally dissolved. The introduction of solid hypochlorite directly into the system is prohibited.
- C. Sterilization tests shall be repeated as often as necessary and as directed by the architect and/or Department of Health, until the minimum residual chlorine content has been maintained. The chlorine solution shall be thoroughly flushed prior to placing the new sections of piping in service. The contractor is cautioned that the spent chlorine solution must be disposed of in such a way as not to be detrimental to plant, animal or aquatic life.
- D. Certification of bacteriological testing for quality of the domestic water shall be conducted, accepted by the Project Engineer, and submitted to the State Construction Office prior to request for final inspection and Beneficial or Final Occupancy Permit.

END OF SECTION

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 REFERENCED SECTIONS

- A. Drawings, Standard General Conditions of the Contract including Supplementary General Conditions, Division-1 Specification Sections, Specification Divisions and Sections as referenced in Division 22 Section "Plumbing General Requirements", and Division 22 Specification Sections as follows apply to work of this section:
 - 1. Section 220110 - Plumbing General Requirements
 - 2. Section 224000 - Plumbing Fixtures
 - 3. Section 220150 - Basic Materials and Methods
 - 4. Section 220700 - Plumbing Insulation

1.2 SUBMITTALS

- A. Submit under provisions of Division 1, and Division 22, "Plumbing General Requirements" the following:
 - 1. Manufacturer's catalog data, installation, dimensions (including rough in dimensions)
 - 2. Operating and maintenance data for plumbing specialty items
 - 3. Catalog data and material certification for pipe materials and fittings.
- B. Provide for all items as listed in this section.

1.3 QUALITY ASSURANCE

- A. Equipment of the same general type shall be of the same make.
- B. Brand names and catalog numbers included with equipment or material specifications are used to indicate quality, rating or operating characteristics of the equipment of material.
- C. All materials provided shall be new and shall be approved by the Underwriter's Laboratories, Inc., wherever that agency has applicable standards.
- D. All work shall be accomplished in a neat, workmanlike manner by experienced journeymen.
- E. All work shall be performed at such times as are required by the progress of the job.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- B. Installer: NC State licensed plumber specializing in performing the work of this section with minimum 3 years experience.

1.5 REGULATORY REQUIREMENTS

- A. Installation and materials shall be in conformance with the North Carolina State Building Code current edition

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1 and Division 220110, Plumbing General Requirements.

1.7 SYSTEM COMPLETION

- A. Provide all bolts, nuts, gaskets, sleeves, hangers, supports, miscellaneous valves and fittings, and specialties required for complete installation of the piping and equipment to be provided.

PART 2 – PRODUCTS

2.1 FLOOR DRAINS

- A. ANSI A112.21.1, coated cast-iron two-piece body with double drainage flange, weep holes, reversible clamping collar, and square, adjustable nickel-bronze strainer; Model Z-415S, as manufactured by Zurn, or equal by Josam, J. R. Smith, or Wade. Provide with Trap Guard in lieu of trap primers. Manufactured by Provent or Equal.

2.2 CLEANOUTS

- A. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless-steel access cover secured with machine screw; as manufactured by Josam, or equal by Zurn, J. R. Smith, or Wade.

2.3 HOSE BIBBS

- A. Bronze or brass with integral mounting flange, hose thread spout, integral vacuum breaker, loose key operated as indicated, in conformance with ANSI/ASSE 1011; as manufactured by Wilkins, Watts, J.R. Smith, Nibco, Woodford, or Crane.

2.4 WATER HAMMER ARRESTORS

- A. ANSI A112.26.1; All stainless-steel construction, meets standards PDI WH-201 and ASSE 1010, filled with glycerin, pressurized with argon, size as indicated by PDI WH 201 letter designation; Series 75000 as manufactured by Josam, or equal by J.R. Smith, or Zurn.

2.5 GLOBE VALVES

- A. Up To and including 2 inches, MSS SP-80, Class 150 body and union bonnet of ASTM B62 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.
- B. Up to and including 2 inches, MSS SP-80, Class 200 and Class 300, body and union bonnet of ASTM B 61, cast bronze, threaded ends, stainless steel plug-type disc, stainless steel seat ring, inside screw rising stem of bronze, brass packing gland, Teflon-impregnated packing, and malleable-iron handwheel.
- C. Over 2 inches, MSS SP-85, Class 125 and Class 250 iron body and bonnet ASTM A 126, Class B cast iron, flanged ends, outside screw and yoke, with Teflon-impregnated packing and two-piece packing gland assembly, and malleable-iron handwheel.

2.6 ANGLE VALVES

- A. Up to and including 2 Inches, MSS SP-80, Class 150, body and union bonnet of ASTM B 62 bronze, inside rising stem of bronze, brass packing gland, Teflon- impregnated packing, and malleable-iron handwheel.
- B. Up to and including 2 Inches, Class 300, body and union bonnet of ASTM B 61 bronze, inside rising stem of bronze, plug disc and seat ring of stainless steel, and malleable- iron handwheel.
- C. Over 2 inches, Class 125, Iron body, MSS SP-85, bronze mounted with body and bonnet ASTM A 126, Class B cast iron, flanged ends, outside screw and yoke, with Teflon-impregnated packing and two-piece packing gland assembly, and malleable iron handwheel.

2.7 BALL VALVES

- A. Up to, and including 2 inches: 150# W.O.G. rating up to 200 F, two-piece-brass bodies,
- B. replaceable reinforced Teflon seat, conventional port, blow-proof stem, chrome-plated brass ball, union, threaded, or soldered ends.

2.8 TRAP PRIMERS

- A. Brass trap primer to discharge a metered amount of water upon pressure change. Provide floor drains with prime connection. PPP or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are 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.
- D. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever joining dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building 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 Sleeves for all pipes passing through floors, walls and ceilings, of sufficient size to receive insulation and of proper length to terminate 1" outside finished surfaces. Pipe sleeves shall be caulked with non-hardening caulking to prevent transmission of noise between floors and walls.
- H. Pipe Penetrations through fire partition walls shall be made by UL penetration detail as indicated with caulking with UL listed fireproof caulking.
- I. Provide clearance for installation of insulation and access to valves and fittings.
- J. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with specified in Division 8.
- K. Establish elevations of buried piping outside the building to ensure not less than 3 ft of cover.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- M. Provide support for utility meters in accordance with requirements of utility companies.
- N. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to Division-26
- O. Excavate in accordance with Division 31 for work of this Section.
- P. Backfill in accordance with Division 31 for work of this Section.
- Q. Install bell and spigot pipe with bell end upstream.
- R. Install valves with stems upright or horizontal, not inverted.
- S. Provide one plug valve wrench for every ten plug valves sized 2 inches and smaller, minimum of one. Provide each plug valve sized 2-1/2 inches and larger with a wrench with set screw.
- T. Install in accordance with manufacturer's instructions.
- U. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system. Encase exterior cleanouts in concrete flush with grade.
- V. Pipe relief from back flow preventer to nearest drain.
- W. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks, water closet flush valves, and washing machine outlets.

3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.

- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install gate, or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to 1/8 or 1/4 inch per foot, as required. Maintain gradients. Slope water piping and arrange to drain at low points.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. After all tests have been satisfactorily completed, disinfect the entire domestic water distribution system, including all supply outlets, with hypochlorites by the tablet method in general accordance with ANSI/AWWA C651.
- B. Provide a minimum of 2 bacteriological test locations at ends of lines.

3.7 SERVICE CONNECTIONS

- A. Provide new sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with by-pass valves pressure reducing valve, and sand strainer.
- C. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Caulk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

END OF SECTION

SECTION 22 33 00 - ELECTRIC WATER HEATERS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide hot water heaters as indicated on the drawings and as specified herein.

1.2 CODES AND STANDARDS

- A. Conform with the standards, requirements and recommendations of the North Carolina Building Code, Local Codes and Ordinances.

1.3 SUBMITTALS

- A. Submit manufacturers product data on all items furnished under this section.

1.4 WARRANTIES

- A. Provide manufacturers warranty against tank leakage for a period of three years, in addition to other warranties required by these specifications.

1.5 RELATED DOCUMENTS

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions, Division-1 Specification sections and other Division 22 specification sections, apply to work of this section.

PART 2 - PRODUCTS

2.1 TANK TYPE

- A. Provide Electric water heaters with the following features and construction:
 1. UL Listed.
 2. ASME tank construction.
 3. Fully automatic controls with safety shut off. 150 psi working pressure.
 4. Temperature and pressure relief valve, ASME rated and approved, automatic reseating pop action, non-sticking test lever type.
 5. Storage tank shall be glass lined steel.
 6. Thermally insulated with minimum 1" min. foam encased in corrosion-resistant steel jacket, baked-on enamel finish.
 7. Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME-rated-temperature and -pressure-relief valve.

2.3 WATER HEATER SCHEDULE

- A. Water heater – See schedules on plumbing drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install domestic water heaters in accordance with manufacturer's instructions.
- B. Allow sufficient clearance and access for inspection and maintenance.
- C. Do not rough piping in front of heater preventing service access and future removal without disassembly of piping except at unions.
- D. Make final hot and cold water piping connections.
- E. Start, test and put into operation before final inspection. Set hot water temperature at 120 deg. F. or as directed by owner or architect.

END OF SECTION

SECTION 23 05 10 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 REFERENCES & INTENT

- A. All work of this Division shall comply with the requirements of the Drawings, General Conditions, Supplementary General Conditions and Division 01 Specifications section.
- B. Study all drawings and specifications before submitting bids.
- C. Work under this Division includes all essential labor, materials, tools, equipment, transportation, insurance, temporary protection, supervision and incidental items for proper installation and operation of all systems even though not specifically mentioned or indicated.
- D. Drawings are diagrammatic. Drawings are not intended to be absolutely precise and do not specify or show every offset, fitting, and component. The purpose of the drawings is to indicate a system concept, the main components of the systems, and the approximate geometrical relationships. Based on the systems concept, the main components, and the approximate geometrical relationships, the contractor shall provide all other components and materials necessary to make the systems fully complete and operational. Contractor shall route piping or provide offsets to avoid interference with structural elements, equipment, electrical panels and junction boxes, etc. Verify locations, dimensions, flow directions, etc. before construction.
- E. It is the intent of these specifications and drawings to provide for finished systems of the quality specified, properly tested, balanced and ready for operation. This includes all devices and accessories required to make the work complete even though such items may not be expressly shown or specified. Drawings and specifications are complementary and must be so construed to determine the full scope of work.
- F. Jobsite Conditions. The Contractor shall visit the site and familiarize himself with the existing conditions before submitting his bid. Failure to do so does not relieve the Contractor from completing the work as specified herein and after. Requests for additional payments due to the Contractor's failure to allow for work conditions will be rejected.

1.2 WORK INCLUDED

- A. The following work is specifically included without limiting the generality implied by these specifications and drawings.
 - 1. All mechanical scope of work specified herein and as shown on the plans. Contractor should review all drawings and include all items that are a part of his scope.
 - 2. All associated wiring, cutting and patching.
- B. Bidders shall examine equipment plans and specifications and include in their bids all labor and material required for complete installation and connection of equipment which is properly a part of their trade even if it is not provided in the equipment specifications.

1.3 STANDARDS AND CODES

- A. All equipment with electrical components shall bear the UL label.

- B. The following minimum standards apply wherever applicable:
- | | |
|--------|--|
| ANSI | American National Standards |
| ASTM | American Society for Testing Materials |
| NBFU | National Board of Fire Underwriters |
| NEC | National Electric Code |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| OSHA | Occupational Safety and Health Act |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association,
Inc. |
- North Carolina Building Code
Any Other Applicable local and State Codes
- C. In the event there are conflicts between specifications and standards or codes, standards or codes shall govern unless specifications are in excess of standards.

1.4 PERMITS AND FEE

- A. Not used.

1.5 STRUCTURAL STEEL AND CONCRETE

- A. Structural members may not be pierced without prior written approval of the Engineer.

1.6 WATERPROOFING

- A. Waterproofed floors and walls may not be cut.

1.7 WORK SCHEDULE

- A. Work schedule shall be in accordance with Division 01.
- B. Any demolition or installation work producing excessive dust or noise deemed to be disruptive or possibly unsafe to building operations must be, at the Owner's discretion, performed after normal working hours.

1.8 PROTECTION OF EQUIPMENT

- A. Provide all necessary protection and be fully responsible for material and equipment stored or installed on the site. Material or equipment stolen or damaged shall be replaced at no additional cost to the Owner.
- B. Provide protection against theft, physical damage and the entry of dirt, water or corrosive fumes into the material and equipment. Maintain protective covers for the duration of construction. Store equipment, such as controls, subject to damage by moisture and temperature extremes in a dry, heated space.
- C. For all cutting, burning and welding operations a hot work permit is required. This permit may be obtained from the University Safety and Risk Management Office at no cost.

1.9 FIRE SAFETY

- A. Fire Watch: Provide a fire watch wherever welding, brazing, cutting or other processes involving an open flame or potential for generating sparks is used. Fire watch shall consist of a person with a 10-pound carbon dioxide fire extinguisher. While on fire watch,

the person so assigned shall have no other duties or assignments.

- B. Fire Blanket: In addition to providing a fire watch, use an approved fire blanket to cover any combustible materials in the immediate area.

1.10 GUARANTEES

- A. Furnish written guarantee in accordance with requirements of General Conditions. Partial approval of a portion of work does not affect the validity of guarantee.

1.11 SHOP DRAWINGS

- A. It shall be noted that shop drawing submittals processed by the Engineer are not change orders; that the purpose of shop drawing submittals is to demonstrate to the Engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install, and by detailing the fabrication and installation methods he intends to use. If deviations, discrepancies or conflicts between shop drawing submittals and the contract documents in the form of design drawing and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed. The Engineer may also require the contractor to submit samples of proposed or specified equipment for approval with the samples to be returned to the contractor upon request.
- B. Prior to procurement or manufacturing, submit for approval appropriate shop drawings and/or descriptive literature giving performance data, physical size, wiring diagrams, configuration, capacity, material, etc., for all items under this Division including the following:
 1. Breeching and flue
 2. Insulation
 3. Condensate Tank Feedwater Pump
- C. The contractor shall visit the site and familiarize himself with the project requirements and the field conditions before preparing shop drawings and ordering equipment. Field verify the characteristics of all specified or existing equipment before preparing shop drawings. This shall include available space, available voltages, suitability of substrate for receiving the specified equipment, etc. Where existing equipment is re-used, he shall verify dimensions, capacities, horsepower, etc. and bring any discrepancies to the attention of the Engineer
- D. Where different products have to work together, it is the Contractor's responsibility to select manufacturers whose products are visually and/or technically compatible.
- E. Prepare listing of all equipment and materials for the project. A sample schedule is included at the end of this section to complete this requirement. Provide all information represented.

1.12 RECORD DRAWINGS

- A. During construction, keep an accurate record of all changes and deviations from contract documents. Upon completion of this installation, the contractor shall submit to the Engineer marked up prints indicating any installed work that is different from what is shown on the drawings. Complete and accurate drawings shall be submitted to the Owner at the conclusion of this project. All changes will be reflected in CAD format. Marked-up as-built drawings will not be permitted.

PART 2 - PRODUCTS

2.1 QUALITY OF MATERIAL

- A. Equipment of the same general type shall be of the same make. Reference is made to relays, motors, valves, motor starters, contactors, etc.
- B. Brand names and catalog numbers included with equipment or material specifications are used to indicate quality, rating or operating characteristics of the equipment or material.
- C. All materials provided shall be new and shall be approved and labeled by the Underwriter's Laboratories, Inc., or other accredited third-party agency, wherever such agency has applicable standards. All work shall be accomplished in a neat, workmanlike manner by experienced journeymen. All work shall be performed at such times as are required by the progress of the job.
- D. All components, equipment and systems shall comply with ASHRAE 90.1 and any other applicable ASHRAE standard.

PART 3 - EXECUTION

3.1 CLEARANCE AND RESTORATION OF SITE

- A. It may be required to temporarily remove existing ceiling tiles, piping, duct, conduits, etc. to introduce new work as specified in this Division. Contractor, after installation of new work, shall reinstall, reconnect removed items to match the existing. Installation of any new equipment shall not compromise existing fire ratings of rated assemblies. All penetrations shall be sealed to existing conditions per UL guidelines for penetration protections. Provide offsets if required in existing piping, ducts etc. to introduce new work.

3.2 COORDINATION

- A. Install all work to permit removal of equipment without damage to the equipment or the building. Verify equipment space requirements, condition of substrate, voltages, etc. at the time of shop drawing submission and advise the Engineer of any conflict.
- B. Coordinate equipment locations as well as piping and conduit routing with Owner's representative to optimize all present and foreseen future space usage and clearance requirements.
- C. Do not rough prior to receipt of approved shop drawings.

3.3 EQUIPMENT INSTALLATION AND SUPPORT

- A. Install all equipment where indicated, in accordance with manufacturer's published installation instructions, and with recognized industry practices to ensure that equipment complies with requirements and serves intended purposes. Consult with Engineer if said instructions or practices conflict with the drawings/specifications.
- B. Support plumb, rigid and true to line all work and equipment furnished under this Division. Study thoroughly architectural, mechanical drawings and all related drawings to determine how equipment, piping, ductwork, etc., are to be supported, mounted or suspended. Provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper support as required whether or not shown on drawings. When directed, furnish for

approval a drawing showing supports.

- C. Any system component which may require maintenance, such as control valves, manual valves, strainers, etc. shall not be installed over electrical equipment, machinery, control panels or floor openings.

34 FINAL ADJUSTMENT AND TESTING

- A. General: Provide all testing, preliminary and final adjustment of instrumentation for this purpose. Conduct all tests in full compliance with applicable codes prior to covering or concealing work by insulation, enclosures, etc. Material found to be defective shall not be repaired. It shall be replaced with new material which tests satisfactorily. Defective workmanship shall be corrected.
- B. Working Tests: Subject all equipment and controls to simultaneous and continuous working tests for a period of one day prior to final inspection. Make adjustments, repairs and equipment replacements as required.

3.5 LABELS, IDENTIFICATION AND TAGS

- A. All components or equipment shall be identified using 3/4-inch high permanent engraved bakelite nameplates or 3/4-inch-high anodized aluminum nameplates - white letter - black background, with minimum 1/4-inch-high letters. Nameplates shall be permanently attached with pin-head screws to device or to wall or mounting panel above device. Stick-on type labels will not be acceptable.

3.6 OWNER'S RIGHT TO TEST SYSTEMS

- A. Should, in the opinion of the Engineer, and during the guarantee period, reasonable doubt exist as to the proper functioning of any equipment installed under this Contract, the right is reserved for the Owner and Engineer to perform any test deemed practical to determine whether such equipment is functioning properly and performing at required capacity. If such tests show proper functioning, the cost of the test will be paid by the Owner. If the tests indicate a deficiency in equipment capacity or performance, the Contractor shall pay the cost of the test and also make good any deficiencies shown by the test to the full satisfaction of the Owner and the Engineer.

3.7 CLEANING UP

- A. The contractors performing work under this section shall at all times keep the premises and the building in a neat and orderly condition and any instructions of the Engineer in regard to the storing of material, protective measures, cleaning up of debris, etc. shall be explicitly followed. At the completion of the job, all equipment shall be cleaned to the satisfaction of the Owner.
- B. The building will be occupied during installation of the new addition and/or alterations as described hereinafter. Thus, special care shall be taken during installation to protect equipment and other furniture in the buildings from dust and debris generated during installation of work specified in this Division.

3.8 INSPECTION CERTIFICATES

- A. Obtain all inspections required by law, ordinances, rules, and regulations of the Authorities having jurisdiction and obtain and furnish to the Engineer certificates of such inspections, pay all fees, charges, and other expenses in connection therewith.

3.9 FINAL REVIEW

- A. Final review and tests of the completed construction shall be performed in the presence of the Engineer or his representative and shall be at such times as are convenient to the Engineer. Final tests shall show conclusively that all equipment performs its intended and specified function and that all work complies with the provisions of these specifications. All material, equipment, and instruments required for the tests shall be furnished by the Contractor at his own expense.

3.10 EQUIPMENT DELIVERY AND PROTECTION

- A. All material shall be delivered and unloaded by the Contractor within the project site as directed by the Owner.
- B. The Contractor shall protect all material and equipment from breakage, theft or weather damage.

3.11 OPERATING INSTRUCTIONS

- A. The Contractor shall provide a minimum of two (2) hours of personal instruction to Owner's personnel in the proper operation of all equipment specified and provided. The instruction shall be provided by factory trained and certified competent personnel.
- B. Maintenance Manuals shall be submitted in one (1) copy in vinyl 3-ring binder and one (1) electronic copy in pdf format. The binder shall have the following:
 - 1. Service telephone number of the installing company, including an emergency number.
 - 2. Contact person, phone number, and address of manufacturer or distributor where equipment was purchased.
 - 3. The manufacturing company's operating and maintenance manuals for each piece of equipment.
 - 4. Copies of all approved shop drawings.
- C. Furnish for each building permanent type charts, framed under glass, mounted where directed as follows:
 - 1. Service organizations with day and night telephone numbers.

SECTION 23 05 23 - GENERAL DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions, Division-1 Specification sections and other Division 23 specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of valves required is indicated on drawings and/or specified in other Division - 23 sections, and by requirements of this section.

1.3 QUALITY ASSURANCE

- A. Valve Types: Provide valves of same type by same manufacturer.
- B. Valve Identification: Provide valves with manufacturer's name (or trademark) and pressure rating clearly marked on valve body.

1.4 CODES AND STANDARDS

- A. MSS Compliance: Mark valves in accordance with MSS-25 "Standard Marking System for Valves, Fittings, Flanges and Unions."
- B. ANSI Compliance: For face-to-face and end-to-end dimensions of flanged – or welded-end valve bodies, comply with ANSI B16.10 "Face-to-Face and End-to-End Dimensions of Ferrous Valves."

1.5 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical product data, including installation instructions for each type of valve. Include pressure drop curve or chart for each type and size of valve. Submit valve schedule showing Manufacturer's figure number, size, location, and valve features for each required valve.

PART 2 - PRODUCTS

2.1 VALVES

- A. General: Provide factory-fabricated valves recommended by manufacturer for use in service indicated. Provide valves of types and pressure ratings indicated; provide proper selection as determined by Installer to comply with installation requirements. Provide end connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Installer's option.
- B. Sizes: Unless otherwise indicated, provide valves of same size as upstream pipe size.
- C. Operators: Provide handwheels, fastened to valve stem, for valves other than

quarter-turn. Provide lever handle for quarter-turn valves, 6" and smaller, other than plug valves. Provide gear operators for quarter-turn valves 8" and larger. Provide chain-operated sheaves and chains for overhead valves 8" and larger or as indicated.

2.2 BALL VALVES

- A. Comply with the following standards:
 - 1. Cast-Iron Valves: MSS SP-72
 - 2. Steel Valves: ANSI B16.34
 - 3. Bronze Valves: MSS SP-110

2.3 BUTTERFLY VALVES

- A. Comply with MSS SP-67, "lug" type.

2.4 VALVE FEATURES

- A. General: Provide valves with features indicated and, where not otherwise indicated, provide proper valve features as determined by Installer for installation requirements. Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. Bypass: Comply with MSS SP-45, and except as otherwise indicated, provide manufacturer's standard bypass piping and valving.
- C. Drain: Comply with MSS SP- 45 and provide threaded pipe plugs.
- D. Flanged: Valve flanges complying with ANSI B16.5, (steel), or ANSI B16.24 (bronze).
- E. Threaded: Valve ends complying with ANSI B2.1.
- F. Butt-Welding: Valve ends complying with ANSI B16.25.
- G. Socket-Welding: Valve ends complying with ANSI B16.11.
- H. Solder-Joint: Valve ends complying with ANSI B16.18.
- I. Flangeless: Valve bodies manufactured to fit between flanges complying with ANSI B16.5 (steel), or ANSI B16.24 (bronze).
- J. Pressure Ratings: Unless indicated otherwise, valve pressure ratings shall be as follows:
 - 1. Water System: Class 150 for bronze valves, Class 125 for iron valves.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Except as otherwise indicated, comply with the following requirements:
 - 1. Install valves where required for proper operation of piping and equipment, including valves in branch lines to isolate sections of piping.
 - 2. Locate valves so as to be accessible and so that separate support can be provided when necessary.
 - 3. Install valves with stems pointed up, in vertical position where possible, but in no

- case with stems pointed downward from horizontal plane unless unavoidable.
4. Install valve drains with hose-end adapter for each valve that must be installed with stem below horizontal plane.
- B. Insulation: Where insulation is indicated, install extended- stem valves, arranged in proper manner to receive insulation.
 - C. Mechanical Actuators: Install mechanical actuators with chain operators where indicated. Extend chains to about 5' above floor and hook to clips to clear aisle passage.
 - D. Selection of Valve Ends (Pipe Connections): Except as otherwise indicated, select and install valves with the following ends or types of pipe/tube connections:
 1. Tube Size 2" and Smaller: Soldered-joint valves.
 2. Pipe Size 2" and Smaller: Threaded valves.
 3. Pipe Size 2-1/2" and Larger: Flanged valves.
 - E. Non-Metallic Disc: Shall not be used, except where indicated.
 - F. Renewable Seats: Select and install valves with renewable seats, except where otherwise indicated.

3.2 BALL VALVES

- A. 400 psi WWP, bronze body, full port, bronze trim, TFE seats and seals. Valves shall be Apollo series, or equivalent.

END OF SECTION

SECTION 23 05 29 - SUPPORTS, ANCHORS AND VIBRATION ISOLATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions, Division-01 Specification sections, and other Division 23 specification sections apply to work of this section.

1.2 QUALITY ASSURANCE

- A. Code Compliance: Comply with applicable codes pertaining to product materials and installation of supports and anchors.
- B. UL and FM Compliance: Provide products which are UL-listed and FM approved where required.
- C. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS) Standard Compliance:
 - 1. Provide pipe hangers and supports of which materials, design, and manufacture comply with MSS SP-58.
 - 2. Select and apply pipe hangers and supports, complying with MSS SP-69.
 - 3. Fabricate and install pipe hangers and supports, complying with MSS SP-89.
 - 4. Terminology used in this section is defined in MSS SP-90.
 - 5. Acceptable Manufacturers: Vibration Mountings and Controls, Inc., Grinnell, Modern, or approved equal.

1.3 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical product data, including installation instructions for each type of support and anchor.

PART 2 - PRODUCTS

2.1 HORIZONTAL-PIPING HANGERS AND SUPPORTS

- A. General: Except as otherwise indicated, provide factory- fabricated, horizontal piping hangers and supports complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for copper-piping systems.
 - 1. Adjustable Steel Clevis Hangers: MSS Type 1.
 - 2. Yoke Type Pipe Clamps: MSS Type 2.
 - 3. Steel Double Bolt Pipe Clamps: MSS Type 3.
 - 4. Steel Pipe Clamps: MSS Type 4
 - 5. Adjustable Swivel Pipe Rings: MSS Type 6
 - 6. Adjustable Steel Band Hangers: MSS Type 7.

7. Adjustable Band Hangers: MSS Type 9.
 8. Adjustable Swivel Rings, Band Type: MSS Type 10.
 9. Split Pipe Rings: MSS Type 11.
 10. Extension Split Pipe Clamps: MSS Type 12.
 11. U-Bolts: MSS Type 24.
 12. Clips: MSS Type 26.
- B. Pipe Slides and Slide Plates: MSS Type 35, including one of the following plate types:
 1. Plate: Unguided type.
 2. Plate: Guided type.
 3. Plate: Hold-down clamp type.
 - C. Pipe Saddle Supports: MSS Type 36, including steel pipe base- support and cast-iron floor flange.
 - D. Pipe Stanchion Saddles: MSS Type 37, including steel pipe base support and cast-iron floor flange.
 - E. Adjustable Pipe Saddle Supports: MSS Type 38, including steel pipe base support and cast-iron floor flange.
 - F. Single Pipe Rolls: MSS Type 41.
 - G. Adjustable Roller Hangers: MSS Type 43.
 - H. Pipe Roll Stands: MSS Type 44.
 - I. Adjustable Pipe Roll Stands: MSS Type 46.

2.2 VERTICAL-PIPING CLAMPS

- A. Except as otherwise indicated, provide factory- fabricated vertical-piping clamps complying with MSS SP-58, of one of the following types listed, selected by Installer to suit vertical piping systems, in accordance with MSS SP-69 and manufacturer's published product information. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.
 1. Two-Bolt Riser Clamps: MSS Type 8.
 2. Four-Bolt Riser Clamps: MSS Type 42.

2.3 HANGER-RODS AND ATTACHMENTS

- A. General: Except as otherwise indicated, provide factory- fabricated hanger-rod attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit horizontal-piping hangers and building attachments, in accordance with MSS SP-69 and manufacturer's published product information. Use only one type by one manufacturer for each piping service. Select size of hanger-rod attachments to suit hanger rods. Provide galvanized steel hanger rods. Provide copper-plated hanger-rod attachments for copper-piping systems.
 1. Steel Turnbuckles: MSS Type 13
 2. Swivel Turnbuckles: MSS Type 15
 3. Malleable Iron Sockets: MSS Type 16

2.4 BUILDING ATTACHMENTS

- A. General: Except as otherwise indicated, provide factory- fabricated building attachments complying with MSS SP-58, of one of the following MSS types listed, selected by Installer to suit building substrate conditions, in accordance with MSS SP-69 and manufacturer's published product information. Select size of building attachments to suit hanger rods. Provide copper-plated building attachments for copper-piping systems.
 - 1. Concrete Inserts: MSS Type 18
 - 2. Channel Clamps: MSS Type 20
 - 3. Welded Beam Attachments: MSS Type 22
 - 4. C-Clamps: MSS Type 23

2.5 SADDLES AND SHIELDS

- A. Except as otherwise indicated, provide saddles and shields under piping hangers and supports, factory-fabricated, for all insulated piping. Size saddles and shields for exact fit to mate with pipe insulation.
- B. Protection Shields: MSS Type 40; of length recommended by manufacturer to prevent crushing of insulation.

2.6 ROOF CURBS AND PENETRATIONS

- A. Prefabricated roof curbs for penetrations shall be provided by this Division.

2.7 MISCELLANEOUS MATERIALS

- A. Metal Framing: Provide products complying with NEMA STD ML 1.
- B. Steel Plates, Shapes and Bars: Provide products complying with ASTM A 36.
- C. Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS standards.

PART 3 - EXECUTION

3.1 INSTALLATION OF HANGERS AND SUPPORTS

- A. Install hangers, supports, clamps and attachments to support piping properly from building structure with maximum loading as shown below. Arrange for grouping of parallel runs of horizontal piping to be supported together on trapeze type hangers where possible. Install supports with maximum spacings complying with MSS SP-69. Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe. Do not use wire or perforated metal to support piping, and do not support piping from other piping.
- B. Hangers and braces shall adequately support the piping system horizontally and vertically and shall allow for expansion and contraction without binding in sleeves or misalignment. Provide for expansion of piping with swing joints and ample sleeves.
- C. Horizontal piping shall be supported with hangers as follows:

STEEL PIPE SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1-1/4 inches	3/8 inch	8 feet
1-1/2 in. & 2 in.	3/8 inch	10 feet

2-1/2 in. & 3-1/2 in.	1/2 inch	12 feet
4 inches and 5 inches	5/8 inch	15 feet
6 inches	3/4 inch	17 feet
8 inches to 12 inches	7/8 inch	22 feet

COPPER TUBE SIZE	ROD DIAMETER	MAXIMUM SPACING
Up to 1-inch	3/8 inch	6 feet
1-1/4 in. & 1-1/2 in	3/8 inch	8 feet
2 inches	3/8 inch	9 feet
2-1/2 inches	1/2 inch	9 feet
3 inches & 4 inches	1/2 inch	10 feet

- D. Load carrying capacities of threaded steel rod based on allowable stress of 12,000 psi.
1. ROD SIZE - INCHES: 3/8 1/2 5/8 3/4 1 1-1/8 1-1/4
 2. ALLOW LOAD - LBS: 610 1130 1810 2710 4960 6230 8000
- E. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories. Except as otherwise indicated for exposed continuous pipe runs, install hangers and supports of same type and style as installed for adjacent similar piping.
- F. Prevent electrolysis in support of copper tubing by use of hangers and supports which are copper plated, or by other recognized industry methods.

3.2 PROVISIONS FOR MOVEMENT

- A. Install hangers and supports to allow controlled movement of piping systems and to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends and similar units.
- B. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

3.3 PIPE EXPANSION

- A. Insulated Piping: Comply with the following installation requirements.
1. Clamps: Attach clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ANSI B31.
 2. Shields: Where low-compressive-strength insulation or vapor barriers are indicated on cold or chilled water piping, install coated protective shields.

END OF SECTION

SECTION 23 05 90 - MECHANICAL PAINTING AND IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. All work of this Division shall comply with the requirements of the Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division 1 Specification Sections.
- B. Section 23 0510 - General Provisions.
- C. Section 22 0110 – Plumbing General Requirements
- D. Division 26 - Electrical

1.2 SCOPE

- A. Paint and/or identify the following:
 - 1. All mechanical equipment and piping
 - 2. Plumbing equipment and piping (by Plumbing Contractor)

1.3 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical product data and installation instructions.

PART 2 - PRODUCTS

2.1 PLASTIC PIPE MARKERS

- A. Snap-On Type: Provide manufacturer's standard pre-printed, semi-rigid, snap-on, color-coded pipe markers, complying with ANSI A13.1. Provide full-band pipe markers, extending 360 degrees around pipe at each location.
- B. Lettering: Manufacturer's standard pre-printed nomenclature which best describes piping system in each instance, as selected by Engineer in cases of variance with name as shown or specified.
- C. Arrows: Print each pipe marker with arrows indicating direction of flow, either integrally with piping system service lettering (to accommodate both directions), or as separate unit of plastic.

2.2 VALVE TAGS

- A. Brass Valve Tags: Provide 19-gage polished brass valve tags with stamp- engraved piping system abbreviation in 1/4" high letters and sequenced valve numbers 2" high, and with 5/32" hole for fastener.
- B. Provide 1-1/2" diameter tags, except as otherwise indicated.
- C. Valve Tag Fasteners: Provide solid brass chain (wire link or beaded type), or solid brass S-hooks of the sizes required for proper attachment of tags to valves and manufactured

specifically for that purpose.

2.3 ENGRAVED PLASTIC-LAMINATE SIGNS AND EQUIPMENT MARKERS

- A. General: Provide engraving stock melamine plastic laminate, complying with FS L-P-387, in the sizes indicated, 1/16" thick, engraved with engraver's standard letter style of the sizes and wording indicated, black with white core (letter color) except as otherwise indicated, punched for mechanical fastening except where adhesive mounting is necessary because of substrate.
- B. Fasteners: Self-tapping stainless steel screws.

PART 3 - EXECUTION

3.1 PAINTING

- A. All equipment, except where otherwise specifically noted, shall be furnished in prime coat. All un-insulated black steel piping shall be prime coated and finish painted in light gray unless otherwise required by schedule below to be color coded. All welds, on both insulated and un-insulated piping, shall be painted with one coat of primer. All miscellaneous black steel items such as hangers and rods, machinery supports, breechings and stacks, etc., shall be prime coated and finish painted in light gray. Exposed surfaces of insulation shall be sealed. All metal surfaces shall be thoroughly cleaned of rust and dirt and shall be degreased before application of primer. All prime coated equipment shall be touched up where prime coats are chipped, scratched, or otherwise damaged. All prime coated equipment shall be thoroughly cleaned and left ready for finish painting. Where cast iron accessories or galvanized pipe, or equipment surfaces are to receive finish painting, the item shall be properly primed.
- B. Ferrous surfaces shall be painted with the following coats:
 - 1. 1 coat of primer equivalent to Bruning Silathane 520-14 grey-green primer, Benjamin Moore 06- 20 red oxide alkyd primer or Richards SR-1399 red metal primer.
 - 2. 2 coats of finish equivalent to Bruning Silathane Gloss Enamel 520-32 quarry gray, Benjamin Moore Gloss Enamel 22-38 or Richards Gloss Enamel 1003 Series.
- C. Finish painting of all equipment and piping (both insulated and un-insulated) shall be provided. Where indicated or specified, existing equipment, piping, duct, etc. shall be cleaned and painted along with new work. Do not paint piping that is provided with aluminum or PVC jacketing insulation covering. Paint piping insulation per color schedule below and provide stenciled identification or plastic pipe markers.
- D. Painting and/or identification shall be in accordance with the following schedule:

<u>ITEM</u>	<u>IDENTIFICATION</u>	<u>COLOR</u>
Domestic Cold Water	DCW	Green
Domestic Hot Water	DHW	Red
Low Pressure Steam	LPS	Blue
Condensate Return	CR	Blue

- E. All other un-insulated ferrous pipes shall be painted light gray with stenciled identification as specified under stenciling.

3.2 GENERAL MECHANICAL IDENTIFICATION

- A. Coordination: Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including valve tags in finished mechanical spaces. Install identification after completion of covering and painting.

3.3 PIPING SYSTEM IDENTIFICATION

- A. General: Install plastic pipe markers on each system indicated to receive identification.
- B. Locate pipe markers and color bands as follows:
 - 1. Near each valve and control device
 - 2. Near each branch
 - 3. Near locations where pipes pass through walls or floors/ceilings, or enter non-accessible enclosures
 - 4. Near major equipment items and other points of origination and termination
 - 5. Spaced intermediately at maximum spacing of 50' along each piping run, except reduce spacing to 25' in congested areas of piping and equipment and in mechanical rooms.
- C. Stenciling: In lieu of plastic pipe markers, stenciling may be used for identification. Apply stenciling after finished painting has been completed. Stencil indication shall be in block letters, applied with black paint (except white paint on black surface) Stencil as follows:

<u>OD Pipe or Covering</u>	<u>Stencil Letter Size</u>
3/4 in. thru 1-1/4 in.	2 in.
1-1/2 in. thru 2 in.	3/4 in.
2-1/2 in. thru 4 in.	1 in.
6 in. and larger	2 in.

- D. All underground lines shall have a magnetic type warning tape installed in the backfill at least six inches below grade.

3.4 VALVE IDENTIFICATION

- A. General: Provide valve tag on every valve, cock and control device in each piping system. List each tagged valve in typed valve schedule for each piping system, and post under glass in main mechanical room and/or boiler room.

3.5 MECHANICAL EQUIPMENT IDENTIFICATION

- A. General: Install engraved plastic laminate sign or plastic equipment marker on or near each major item of mechanical equipment and each operational device, as specified herein if not otherwise specified for each item or device. Provide signs for the following general categories of equipment and operational devices:
 - 1. VAV Boxes
 - 2. Main control and operating valves, including safety devices.

END OF SECTION

SECTION 23 07 00 - MECHANICAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions, Division-1 Specification sections and other Division 23 specification sections, apply to work of this section.

1.2 RATING

- A. All insulation systems, including jackets and adhesives shall be U.L. rated and FM approved. All insulation for indoor use shall have a maximum permanent flame spread rating of 25 or less and a smoke developed rating of 50 or less, as tested by ASTM E 84 (NFPA 255) method. Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150. Submit smoke and flame ratings for every material proposed for use.
- B. Make: Certain Teed, Owens Corning, Johns Manville, Knauf and PPG.

1.3 SCOPE

- A. Furnish and install insulation for the following:
 - 1. Steam, condensate, makeup water, and feedwater piping.

1.4 QUALITY ASSURANCE

- A. Insulation contractor shall be member of either the National Insulation Association (NIA) or the Southeastern Insulation Contractors Association (SEICA).

1.5 SUBMITTALS

- A. Submit evidence of membership in NIA or SEICA.
- B. Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.
- C. Submit, if requested by Designer, manufacturer's sample of each piping insulation type required, and of each duct and equipment insulation type required. Affix label to sample completely describing product.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

- A. Type 1: Thermal Pipe Insulation with Jacket. Preformed Fiberglass Pipe insulation complying with ASTM C547, Class 3, rigid, molded pipe insulation, noncombustible. Maximum K-factor of .24 at mean temperature of 75°F. All insulation shall have a jacket of white kraft paper reinforced with a glass fiber yarn and bonded to an aluminum foil, with

self sealing longitudinal laps and butt strips. Jacket shall comply with ASTM C1136 (Type 1). Insulation and jacket shall be equal to Johns Manville Micro-Lok with AP-T Plus, PPG Industries, Owens Corning, Certainteed, or Knauf. Insulate all fittings, valves and strainers with molded fittings, mitered segments of pipe insulation or over- sized pipe insulation held in place with wire. Finish in accordance with manufacturers recommendations to comply with the UL Systems listing. Preformed jackets of PVC material as manufactured by Zeston 2000 PVC, Inc. or equal by George Fisher, Inc., or Photo Corp., may be used at fittings.

- B. Type 2: Flexible Pipe Insulation.
 - 1. Material: Flexible, closed cell, elastomeric thermal insulation, minimum
 - 2. k value .27 at 75 degrees F., conforming to ASTM C 534.
 - 3. Fittings: Sleeve type fitting covers and miter cut tubular form.
 - 4. Make: Armstrong AP Armaflex, Rubatex No. R-180-J, or Johns Manville Corp. or approved equal.
 - 5. Pipe Insulation Below Grade Field-insulated pipes
- C. Type 3: Cellular glass, maximum K-factor of 0.32 @ 75 deg. F, factory fabricated sizes to conform to pipe size. Insulation shall be 1-1/2" thick for all pipe sizes.
- D. Make: Pittsburgh Corning Foamglas, or approved equal by Thermacor Process, Inc. or Urecon System, Inc.

2.2 FIELD APPLIED JACKETS

- A. Where required, the following jackets shall be applied in addition to the insulation jacket specified above. PVC fitting covers and jacketing, .030" (.3 mm) thickness of white, gloss finish, weather-able grade, UV resistant, PVC material. Flame spread/ smoke developed of 25/50 per ASTM-E84. Install per manufacturer's specification. Fitting covers shall be shaped to exact fit. Longitudinal seam shall lap over from above to drain rainwater overlap. Attach with weld adhesive product provided by the jacket manufacturer. Provide bands as required and where requested.
- B. Manufacturers: John Manville Zestar 300, Owens Corning Speeline or Knauf PVC Jacketing Fitting Covers.
- C. Canvas Jacket: UL listed fabric, 8 oz/sq yd, plain weave cotton treated with dilute fire-retardant lagging adhesive.
- D. Aluminum Jacket: 0.016-inch-thick sheet, embossed finish, with longitudinal slip joints and 2-inch laps, die shaped fitting covers with factory attached protective liner.
- E. Stainless Steel Jacket: Type 304 Stainless steel, 0.10-inch, corrugated finish.

2.3 PIPE INSULATION THICKNESS

- A. Type 1
 - 1. Steam: Insulate steam pipe with 2" insulation.
 - 2. Condensate and Feedwater: Insulate condensate and feedwater piping with 1 1/2" insulation.
 - 3. Makeup water: Insulate makeup water with 1/2" insulation.
- B. Type 2

1. Not used
- C. Type 3
1. Not Used

2.4 DUCT INSULATION

- A. Type A: Vapor Seal Duct Insulation
1. Material: Fiberglass duct wrap 1 lb. density with FSK facing complying with ASTM C1290. Maximum K-factor of .31 at 75°F. Jacket shall be FSK aluminum foil reinforced with fiber glass yarn and laminated to fire resistant kraft paper, secured with UL listed pressure sensitive tape and outward clinch expanding staples and vapor barrier mastic. Johns Manville Microlite or equal by Owens Corning or Knauf.
 2. Thickness shall be 2 inches.
- B. Type B: Vapor Seal Duct Insulation - Rigid
1. Fiberglass ductboard complying with ASTM C612, Type I. 3 lb. density with maximum K-factor of 0.23 at 75° F mean temperature. Jacket shall be FSK aluminum foil reinforced with fiber glass yarn and laminated to fire resistant kraft paper, secured with UL listed pressure sensitive tape and outward clinch expanding staples and vapor barrier mastic. Johns Manville 800 or equal by Owens Corning or Knauf.
 2. Thickness shall be 1-1/2 inches.
 3. In exposed locations, such as mechanical rooms, cover insulation with canvas jacket. Canvas jacket shall be UL listed fabric, 8 oz/sq yd, plain weave cotton treated with dilute fire-retardant lagging adhesive.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All insulation shall be applied by experienced pipe coverers and journeymen in accordance with best trade practice. Work shall be as recommended by manufacturer's latest printed installation directions. Test, inspect, and clean all surfaces to be insulated before applying insulation. Take all possible precautions to protect work of other trades. Provide protective covering as required to accomplish this and be responsible for returning all equipment and material to its original new condition and appearance where damage occurs due to neglect.
- B. Protect insulation where supported in hangers by means of inserts or saddles sufficiently large to prevent crushing of insulation.
- C. Apply adhesive to exposed risers to prevent slipping and turning.
- D. Butt covering neatly to walls, floors, ceiling. Apply bands at end and position so band covers gap between surface and insulation where exposed.
- E. At butt ends of insulation the jacket material shall be pulled over exposed ends and secured with bands to give a neat and finished appearance. Exposed fiberglass material will not be permitted.
- F. In location where it will be exposed to view do not apply insulating cement until there is heat on lines.

- G. Do not cover nameplates on equipment.
- H. Do not insulate vibration eliminators.

3.2 PIPE INSULATION SHALL BE APPLIED AS FOLLOWS

- A. Type 1: Thermal Pipe Insulation with Canvas Jacket
 - 1. Steam piping.
 - 2. Condensate piping.
 - 3. Feedwater piping.
 - 4. Makeup water piping.
- C. Type 2: Flexible Pipe Insulation
 - 1. Not Used
- D. Type 3: Closed Cell Pipe Insulation
 - 1. Not Used

3.3 DUCT INSULATION SHALL BE APPLIED AS FOLLOWS

- A. Type A: Vaporseal Duct Insulation.
 - 1. Not used
- B. Type B: Rigid Duct Insulation
 - 1. Not used.

3.4 SPECIFIC REQUIREMENTS

- A. Insulation shall be installed according to manufacturer recommendations. Insulation over the expansion joint and the flexible section shall be loose and of adequate length to permit the movement of pipe.
- B. Provide insulation shield equivalent to Fee and Mason Fig. 81 at each support.

3.5 DO NOT INSULATE

- A. Vibration eliminators.

END OF SECTION

SECTION 23 21 60 - PIPES AND PIPE FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Standard General Conditions of the Construction Contract, including Supplementary General Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

- A. Extent of pipes and pipe fittings required is indicated on drawings and/or specified in other Division-23 sections.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify welding procedures, welders and operators in accordance with ASME Boiler and Pressure Vessel Code, Section IX, for shop and project site welding of piping work. Owner reserves the right to perform nondestructive testing of welded pipe joints by radiographic inspection whether or not explicitly required by code.
- B. All welding of piping up to the second stop shall be done by the holder of an ASME "PP" Stamp.
- C. Owner reserves the right to utilize any testing procedure listed in Chapter VI ANSI/ASME B31.1 to verify structural integrity of any weld(s) not meeting Engineer's approval. If integrity of weld(s) is found to be in compliance with ANSI B31.1, Owner will pay for the additional testing cost. If weld(s) is found to be deficient, contractor shall be responsible for all costs associated with the testing and repair of the weld(s).

PART 2 - PRODUCTS

2.1 GENERAL

- A. Where called for in the scope or where shown in drawings, use applicable products from those specified below.
- B. Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.
- C. Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

2.2 STEEL PIPES AND PIPE FITTINGS

- A. Applications (Steam, condensate, and feedwater)
 - 1. Carbon Steel Pipe: Schedule 40 (minimum) ASTM A 53 for piping 4" and larger, A 106 or A 120 for piping 3" and smaller; except comply with ASTM A 53 or A 106 where close coiling or bending is required.
 - 2. Malleable-Iron Threaded Fittings: ANSI B16.3; plain or galvanized as indicated.
 - 3. Malleable-Iron Threaded Unions: ANSI B16.39; selected by Installer for proper piping fabrication and service requirements, including style, end connections, and metal-to-metal seats (iron, bronze or brass); plain or galvanized as indicated.
 - 4. Threaded Pipe Plugs: ANSI B16.14.
 - 5. Steel Flanges/Fittings: ANSI B16.5, including bolting and gasketing of the following material group, end connection and facing, except as otherwise indicated.
 - a. Material Group: Group 1.1.
 - b. End Connections: Buttwelding.
 - c. Facings: Raised-face.
 - 6. Forged-Steel Socket-Welding and Threaded Fittings: ANSI B16.11, except MSS SP-79 for threaded reducer inserts; rated to match schedule of connected pipe.
 - 7. Pipe Nipples: Fabricated from same pipe as used for connected pipe; except do not use less than Schedule 80 pipe where length remaining unthreaded is less than 1-1/2", and where pipe size is less than 1-1/2", and do not thread nipples full length (e.g., no close-nipples).

2.3 COPPER TUBE AND FITTINGS (Makeup water)

- A. Copper Tube: ASTM B 88; Type (wall thickness) as indicated for each service; hard-drawn temper, except as otherwise indicated.
 - 1. DWV Copper Tube: ASTM B 306.
 - 2. ACR Copper Tube: ASTM B 280.
 - 3. Cast-Copper Solder-Joint Fittings: ANSI B16.18.
 - 4. Wrought-Copper Solder-Joint Fittings: ANSI B16.22.
 - 5. Cast-Copper Solder-Joint Drainage Fittings: ANSI B16.23.
 - 6. Wrought-Copper Solder-Joint Drainage Fittings: ANSI 16.29.
 - 7. Cast-Copper Flared Tube Fittings: ANSI B16.26.
 - 8. Bronze Pipe Flanges/Fittings: ANSI 16.24.
 - 9. Copper-Tube Unions: Provide standard products recommended by manufacturer for use in service indicated.

2.4 MISCELLANEOUS PIPING MATERIALS/PRODUCTS

- A. Provide welding materials to comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.
- B. Provide Blue, Black or equal pipe joint compound.
- C. Soldering Materials: Provide soldering materials as follows:
 - 1. Tin-Antimony Solder: ASTM B 32, Grade 95TA. (For pipe size 1-1/2" & under)
 - 2. Brazing Alloy: Silver 15%, copper 80%, phosphorous 5%. (For pipe size 2" and larger)
 - 3. Gaskets for Flanged Joints: ANSI B16.21; raised-face for steel flanges, unless otherwise indicated

2.5 DISSIMILAR PIPE UNIONS

- A. Piping Connectors for Dissimilar Non-Pressure Pipe: Elastomeric annular ring insert, or

elastomeric flexible coupling secured at each end with stainless steel clamps, sized for exact fit to pipe ends and subject to approval by plumbing code.

- B. Piping Connectors for Dissimilar Pressure Pipe (Dielectric Union to be full-port, teflon seat ball bronze valves):
- C. General: Provide bronze ball valves to effectively isolate ferrous from non-ferrous piping (electric conductance), prevent galvanic action, and stop corrosion. Do not use rubber gasket type Dielectric Unions

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently leak-proof piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings, but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. All 90-degree elbows shall have long radius. Two 45-degree elbows in lieu of one 90-degree elbow are not permitted where short elbows are used. Reduce sizes (where indicated) by use of reducing fittings. Align piping accurately at connections, within 1/16" misalignment tolerance. Comply with ANSI B31 Code for Pressure Piping.
- B. Locate piping runs, except as otherwise indicated, vertically and horizontally (pitched to drain) and avoid diagonal runs unless such routing is clearly indicated on the drawings. Orient horizontal runs parallel with walls and column lines. Locate runs as shown or described by diagrams, details and notations or, if not otherwise indicated, run piping in shortest route which does not obstruct usable space or block access for servicing building and its equipment. Hold piping close to walls, overhead construction, columns and other structural and permanent-enclosure elements of building. Provide manual air vents at all high points in the piping. Provide a system drain and drains at all low points in the piping to allow complete system drainage. All vent and drain piping within the mechanical room shall run down the wall to the floor drain with shut-off ball valves located four feet above the ground. All other vents shall be piped to a nearby location facing downwards.

3.2 PIPING SYSTEM JOINTS

- A. Thread pipe in accordance with ANSI B2.1; cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint compound, or pipe joint tape (Teflon) where recommended by pipe/fitting manufacturer, on male threads at each joint and tighten joint to leave not more than 3 threads exposed.
- B. Solder copper tube-and-fitting joints where indicated, in accordance with recognized industry practice. Cut tube ends squarely, ream to full inside diameter, and clean outside of tube ends and inside of fittings. Apply solder flux to joint areas of both tubes and fittings. Insert tube full depth into fitting, and solder in manner which will draw solder full depth and circumference of joint. Wipe excess solder from joint before it hardens.
- C. Weld pipe joints in accordance with ASME B31.1 or ASME B31.9, as applicable.
 - 1. Welding: Pipe welding in sizes 2 inches and smaller may be either by the Manual

Metallic Arc Process or the Oxyacetylene Welding Process, and in sizes larger than 2 inches shall be by the Manual Metallic Arc Process with coated electrodes.

2. All welding of steam piping shall be done in conformance with Chapter V of the latest edition of the ANSI/ASME Code for Power Piping B31.1.
 - A. Operators who are to do the welding must be properly qualified to do satisfactory work. Proof of an operator's qualifications shall be either the Contractor's record of suitable tests passed within the preceding 90 days while in the employ of the Contractor or maintaining his qualifications by welding at least every 90 days since last test. Any workman considered by the Engineer as not having the skill necessary for the work shall be required to pass an appropriate qualification test or shall be at once barred from further welding on the job.
 - B. Joints shall be properly beveled, thoroughly cleaned of rust or other foreign matter, and degreased before welding. Metallic arc-welding electrodes shall conform to ASTM A233. Oxyacetylene welding rods shall be commercial steel gas welding rods and shall conform to ASTM A251, GA60.
 - C. All piping connections shall be with pre-manufactured fittings (T, elbow, etc.) or with "weldolets," "threadolets" or "sockolets." This includes instrumentation such as thermometer wells, etc.
 - D. "Weldolets" with outlet size 2-1/2" and larger and "Threadolets" or "Sockolets" with outlet size 2" and smaller may be used for branch takeoff up to one half (1/2) diameter of main. Use "Threadolets" where threaded fittings are specified and use "Sockolets" where socket weld fittings are specified. Materials of "Weldolets" and "Threadolets" shall match material of piping.
 - E. Mitered ells, welded branch connections, notched tees and "orange peel" reducers are not allowed. Unless specifically indicated, reducing flanges and reducing bushings are not allowed.
 - F. Flanged Joints: Match flanges within piping system, and at connections with valves and equipment. Clean flange faces and install gaskets. Tighten bolts to provide uniform compression of gaskets.

3.3 CLEANING, FLUSHING, INSPECTING

- A. Cleaning and flushing of piping shall only be done on new sections of pipe. Cleaning chemicals shall not be introduced into existing piping. Taps shall be installed in piping as needed to introduce chemicals into new sections of pipe while existing sections are isolated.
- B. Clean exterior surfaces of installed piping systems of superfluous materials and prepare for application of specified coatings (if any). Flush out piping systems with clean water before proceeding with required tests. Flush system with water until it runs clean. If Owner desires, introduce chemicals provided by Owner unless specific section of this Division dictates otherwise. Fill, vent, drain and refill system. Circulate water in entire system and clean all strainers, check valves, etc. Inspect each run of each system for completion of joints, supports and accessory items. Remove start up strainers and leave for owner's inspection.
- C. Inspect pressure piping in accordance with procedures of ASME B31.1 or ASME B31.9,

as applicable. Owner reserves the right to perform radiographic inspections of welded joints in pressure piping.

3.4 PIPING TESTS

- A. Test new pressure piping in accordance with ASME B31.1 or ASME B31.9, as applicable. Minimum test pressure shall be 1-1/2 times the normal operating pressure or 100 psi, whichever is greater, unless otherwise indicated. Isolate existing piping to the extent possible to not subject it to excessive pressure.
- B. Notify Owner at least 24 hours in advance of pressure test to allow for Owner observation. If Owner is not properly notified, contractor shall repeat pressure test in Owner's presence.

END OF SECTION

SECTION 23 53 18 - BOILER BURNERS

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 CODES AND STANDARDS

- A. The burner shall be UL approved and installed in accordance with state and local codes, requirements of the local gas utility, and the NC Department of Labor Boiler and Pressure Vessel Division.
- B. The gas train shall be in full accordance with NC requirements.

1.3 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating where applicable), furnished specialties and accessories; and installation and start-up instructions.

PART 2 - PRODUCTS

2.1 BURNER FEATURES

- A. Furnish and install one UL labeled, natural gas burner capable of low NOx. Burner shall be matched to Weil McLain boiler. Burner shall have a rated input capacity of 3,800,000 BTU/hr firing natural gas with negative draft flue. Gas pressure regulator shall be provided if needed for inlet gas pressure of 10".
- B. The burner shall be Webster, Power Flame, Gordon-Piatt, or equal. All combustion air shall be furnished by the burner fan which shall be an integral part of the burner. The burner shall be capable to perform in compliance with lower Nox emission requirements of no greater than 40 PPM without the use of external flue gas recirculation. Relief pressure to be 15psi.
- C. The gas burner shall burn the specified quantity of fuel without objectionable noise, vibration or pulsation with not more than 15% excess air no CO in the products of combustion on gas firing.
- D. The burner shall incorporate a stainless-steel flame retention type combustion head for long life and efficient operation. Burners which have refractory or cast-iron type combustion heads will not be approved. Burner shall be capable of low and high fire based on distance from steam pressure setpoint, 5 to 10 psi with 1 psi below setpoint brings on high fire.
- E. The burner is to be equipped with a heavy welded steel blower housing with integral fan scroll.
- F. A permanent observation port shall be provided in the burner to allow observation of both

the pilot and main flame.

- G. Supply voltage available will be as scheduled. All motors and overloads shall be suitable for use on this voltage. All burner controls shall be for use with 120V 1PH 60HZ. Control cabinet shall be provided with a single point connection for a supply voltage. The 120-volt control voltage shall be supplied through the single point burner electrical connection.

2.2 PILOT GAS TRAIN

- A. A separate pilot gas cock, gas pressure regulator and pilot safety valve shall be provided for the ignition gas supply.

2.3 GAS VALVE TRAIN

- A. Provide an NC DOL approved gas train.
- B. The gas train piping shall include a 1/4" NPT pressure tapping with a 1/4" pipe plug upstream and downstream of each valve and regulator in the gas train.
- C. Provide a gas pressure gauge to indicate the gas burner manifold pressure.
- D. Furnish and install one manually operated ball valve upstream of all valves.
- E. Provide one main gas pressure regulator with vent to outside atmosphere, in accordance with local codes.
- F. Provide one automatically operated motorized safety shutoff gas valve, with proof of closure.
- G. Provide a second automatically motor operated gas safety shutoff valve to operate simultaneously with the above gas valve.
- H. A normally open, fully ported electrically operated valve shall be provided in a vent line connected between the two safety shutoff valves. The vent pipe shall be run outside to atmosphere and provided with union to check vent valve operation. Size per NCDOL requirements.
- I. A manually operated lubricated gas valve shall be located downstream of both safety shutoff gas valves to permit leakage testing of the valves. A leak test gauge and gauge cock shall be provided.
- J. Gas pressure supervision shall be provided by approved pressure switches interlocked to accomplish a nonrecycling safety shutdown in the event of either high or low gas pressure

2.4 BURNER CONTROLS

- A. The on-off operation of the burner shall be controlled by steam pressure by means of a pressure control.
- B. An additional high limit safety pressure control of the manual reset type shall be provided to control the burner.
- C. Pre- and post-purge operation of the burner fan shall be provided.
- D. A manual restart of the burner shall be necessary in the event of shutdown due to flame

failure.

- E. All motors shall be controlled and protected by an automatic starter with overload protection. Starter shall be interlocked to prevent burner operation when overload relays are tripped out.
- F. Supply a burner mounted air flow switch to prevent the energization of the main fuel valves in the event of insufficient combustion air.
- G. Manual reset of system shall be required to restart burner after a combustion air flow failure has occurred.
- H. The control cabinet(s) shall house the flame safeguard control, programming purge timer, burner motor starter, fuses, control switches, alarm bell with automatic reset silencing switch to ring on low water or flame failure, control transformer, indicating lamps as specified and relays that may be required.
- I. The burner shall be equipped with suitable fuel and air controls to assure smooth main flame ignition.
- J. Low fire start shall be provided for ignition of fuel. Pre-ignition purge air flow rate shall be no less than 60% maximum firing rate air flow. Three position high-low-off operation of fuel shall be provided. A high-low pressure control shall be mounted in the steam header to control the fuel valve which shall in turn control the operation of the air supply.
- K. A low-high-low pressure control shall electrically switch the burner to low or high fire position to best meet varying system load conditions. When the operating control is satisfied the burner shall shutoff and shall return to the low fire start position.
- L. An electronic safety combustion control shall be supplied complete with scanner to monitor the pilot and main flames. It shall be utilized to provide an interrupted type gas-electric ignition and pre-ignition purge timer. The scanner shall detect the ultraviolet radiation. LED light display shall indicate operating status including low or high fire. Provide dry contact to operate if boiler is in alarm. Alarm status indicator to be field wired.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install burner and accessories as indicated, in accordance with manufacturer's installation instructions, and with recognized industry practices, to ensure that burner and accessories comply with requirements and serve intended purposes. Comply with requirements of state and local boiler codes, applicable portions of ASME Boiler and Pressure Vessel Code, and applicable portions of ASME B31.1 or ASME B31.9.

3.2 FIELD QUALITY CONTROL

- A. Services: After testing and inspection is complete, provide the services of an authorized factory service representative to perform start-up and operation demonstration services for the engineer and maintenance staff to witness. This will include written confirmation on the startup report that all safeties and control devices are properly installed, wired, and operating correctly. A copy of the start up report shall be included in the O&M manuals. The tests shall be run at both high and low fire and at least three tests per fire level to

indicate the most efficient operation. As a minimum the start-up report shall include:

1. CO₂
 2. CO
 3. O₂
 4. NO_x
 5. Ambient temperature
 6. Stack temperature
 7. Flame signal
 8. Furnace pressure-draft
 9. Excess air
 10. Gas pressure at regulator
 11. Gas pressure at burner
 12. Burner Amps
 13. Burner efficiency
 14. Fuel-to steam efficiency
 15. Test equipment used.
- B. Final calculation for each burner shall be made which certifies gross output, gross input, and flue gas loss. This shall be permanently labeled on burner.
- C. In addition to the standard warranty, the manufacturer's representative shall provide a one-year emergency service contract.
- D. Provide two hours of training on the boiler primarily going over controls.

END OF SECTION

SECTION 23 82 68 - CAST IRON SECTIONAL BOILER AND BOILER BURNER

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 CODES AND STANDARDS

- A. The burner shall be UL approved and installed in accordance with state and local codes and the NC Department of Labor Boiler and Pressure Vessel Division.
- B. The boiler shall be manufactured to conform with Section IV of the ASME Boiler and Pressure Vessel Code and installed in accordance with state and local codes and the NC Department of Labor Boiler and Pressure Vessel Division.

1.3 SUBMITTALS

- A. Manufacturer's Data: Submit manufacturer's technical product data, including rated capacities of selected model clearly indicated, weights (shipping, installed, and operating where applicable), furnished specialties and accessories; and installation and start-up instructions.

PART 2 - PRODUCTS

- 2.1 Manufacturer: Boilers shall be model 80 as manufactured by Weil McLain or equal by Peerless, Burnham, or Smith.

2.2 BOILER

- A. Furnish and install sectional cast iron steam boiler, or equal, gross I-B-R output as scheduled on the drawings, propane or natural gas with positive draft, category 3 venting. Boiler shall include:
 - 1. 15 psi ASME rated pressure relief valve, piped to the floor.
 - 2. Steam pressure gage.
 - 3. Low pressure (operating) and high pressure (safety) controls.
 - 4. UL labeled low water cut-off to prevent burner operation when boiler water falls below safe level.
 - 5. Cast iron sections with 80 psi water and 15 psi steam ASME Boilers and Pressure Vessels Code rating, assembled with push nipples or gaskets and draw rods.
 - 6. Flame observation ports.
 - 7. Access to flue passages for cleaning.
 - 8. Steel flue damper assembly with lockable adjustable damper.
- B. Structural Base: Aluminized steel lined with high temperature mineral fiber insulating panels.
- C. Jacket: 3" glass fiber insulated steel jacket, finished with factory applied baked enamel.

2.3 BURNER FEATURES

- A. Furnish and install one UL labeled propane/natural gas oil burner. Burner shall be Webster JB series, or equal by Power Flame or Gordon-Piatt. Firing ratings shall be based on balanced pressure flue.
- B. All combustion air shall be furnished by the burner fan which shall be an integral part of the burner.
- C. The burner shall burn the specified quantity of fuel without objectionable noise, vibration, or pulsation with not more than 12% excess air and no CO in the products of combustion on oil firing.
- D. The burner shall incorporate a stainless-steel flame retention type combustion head for long life and efficient operation. Burners which have refractory or cast-iron type combustion heads will not be approved.
- E. The burner is to be equipped with a heavy welded steel blower housing with integral fan scroll.
- F. A permanent observation port shall be provided in the burner to allow observation of both the pilot and main flame.
- G. Supply voltage available will be 120 V, 1 PH, 60 HZ and 120 V, 3 PH, 60 HZ. All motors and overloads shall be suitable for use on this voltage. All burner controls shall be for use with 120V 1PH 60HZ.

2.4 BURNER CONTROLS

- A. The modulating operation of the burner shall be controlled by steam pressure.
- B. An additional high limit safety pressure control of the manual reset type shall be provided to control the burner.
- C. Pre- and post-purge operation of the burner fan shall be provided.
- D. A manual restart of the burner shall be necessary in the event of shutdown due to flame failure.
- E. All motors shall be controlled and protected by an automatic starter with overload protection. Starter shall be interlocked to prevent burner operation when overload relays are tripped out.
- F. Supply a burner mounted air flow switch to prevent the energization of the main fuel valves in the event of insufficient combustion air.
- G. Manual reset of system shall be required to restart burner after a combustion air flow failure has occurred.
- H. The control cabinet(s) shall house the flame safeguard control, programming purge timer, burner motor starter, fuses, control switches, alarm bell with automatic reset silencing switch to ring on low water or flame failure, control transformer, indicating lamps as specified and relays that may be required

- I. The burner shall be equipped with suitable fuel and air controls to assure smooth main flame ignition.
- J. Low-fire start shall be provided for ignition of fuel. Pre-ignition purge air flow rate shall be no less than 60% maximum firing rate air flow. Full modulation operation of fuel shall be provided. An integral temperature control shall modulate the burner to best meet varying system load conditions. When the operating control is satisfied the burner shall shutoff and shall return to the low fire start position.
- K. An electronic safety combustion control shall be supplied complete with scanner to monitor the pilot and main flames. It shall be utilized to provide an interrupted type electric ignition and pre-ignition purge timer. The scanner shall detect the ultraviolet radiation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in boiler accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 54 and the NC Fuel Gas Code and Mechanical Code.
- C. Install boiler on the existing concrete housekeeping base.
- D. Pipe relief valves to the floor.
- E. Provide for connection to electrical service.
- F. Install burner and accessories as indicated, in accordance with manufacturer's installation instructions, and with recognized industry practices, to ensure that burner and accessories comply with requirements and serve intended purposes. Comply with requirements of state and local boiler codes, applicable portions of ASME Boiler and Pressure Vessel Code, and applicable portions of ASME B31.1 or ASME B31.9.

3.2 FIELD QUALITY CONTROL

- A. Services: After testing and inspection is complete, provide the services of an authorized factory service representative to perform start-up and operation demonstration services. A copy of the start up report shall be included in the O&M manuals. The tests shall be run at both high and low fire and at least three tests per fire level to indicate the most efficient operation. As a minimum the startup report shall include:
 - 1. CO₂
 - 2. CO
 - 3. O₂
 - 4. NO_x
 - 5. Ambient temperature
 - 6. Stack temperature
 - 7. Flame signal
 - 8. Furnace pressure-draft
 - 9. Excess air
 - 10. Burner Amps
 - 11. Burner efficiency

12. Test equipment used.

- B. Final calculation for each burner shall be made which certifies gross output, gross input, and fuel loss. This shall be permanently labeled on burner.
- C. In addition to the standard warranty, the manufacturer's representative shall provide a one-year emergency service contract.

END OF SECTION

SECTION 23 82 75 - BREECHINGS, CHIMNEY, & STACKS - CAST IRON SECTIONAL BOILER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Instructions to Bidders and General Conditions of the Construction Contract, including Supplementary General Conditions and Division-I Specification sections, apply to work of this section.

1.2 SUBMITTALS

- A. Manufacturer's Data: Submit product data including materials, dimensions, weights, and accessories.

1.3 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. NFPA: Comply with NFPA 211 Standard for Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances.
 - 2. UL: Comply with applicable portions of UL safety standards, provide products which have been UL listed and labeled.

PART 2 - PRODUCTS

2.1 BOILER VENT/STACKS

- A. Factory-built vent/stack shall be laboratory tested and listed by the Underwriters Laboratories, Inc. for use with building heating equipment burning gas, solid or liquid fuels as described in NFPA 211, which produce exhausted flue gases at a temperature not exceeding 1400 deg F. under continuous conditions.
- B. New boilers will use Category III smooth double wall flue pipe. The flue gas carrying pipe shall be 304 stainless steel alloy, .035" nominal thickness for all diameters. The outer jacket shall be aluminized steel inside the building, and 304 stainless steel outside the building. Joints must be of a design for Category III pressurized venting. Manufacturer's installation instruction must be on site and followed closely. The installation literature must allow for supporting up to 100' of flue pipe vertically from a base piece mounted in the chimney as shown of the drawings
- C. Barometric dampers shall be of the same material as the vent pipe and designed for installation in the vent pipe.
- D. When the breaching and chimney is installed according to the manufacturer installation instructions and the limits of its listing, it shall comply with national safety standards and building codes.
- E. Inner pipe joints shall be sealed by use of V Bands and RTV Silicone Sealant for flue gas temperatures up to 600 deg. or as outlined in the installation instructions and supplied by the manufacturer.
- F. The stacks extending above roof surfaces or out walls must terminate as required by local

code and manufacturer's instruction with factory roof caps or factory wall caps.

PART 3 - EXECUTION

3.1 INSTALLATION OF FABRICATED BREECHINGS AND CHIMNEYS

- A. Joints: Weld joints in conformance with AWS workmanship standards of AWS D9.1, Specification for Welding Sheet Metal.
 - 1. Align breechings accurately at connections, with a smooth internal surface and a 1/8" misalignment tolerance.
 - 2. Slope breechings down slightly to appliances.
 - 3. Anchor breechings to building structure with bolts, concrete inserts, steel expansion anchors (not lead-shield type), welded studs, C-clamp or special beam-clamps.

- B. Vertical Breechings:
 - 1. System to be fully supported from base piece that incorporates a condensate drain. The vertical flue is to be kept centered in the existing chimney by a spoke system slid down the chimney from the top at intervals recommended by then manufacturer.

- C. Horizontal Round Breechings:
 - 1. Support with girth strap and strap hanger (of same size); except for sizes over 50" in diameter. Install pair of strap hangers bolted to opposite sides of angle reinforcing rings or flanged joints. Support breechings at 10-foot intervals with hangers as follows for corresponding diameters.
 - a. Up to 30" diameter: 1" x 16 gage strap hangers.
 - b. 31" to 50" diameter: 1-1/2" x 16 gage strap hanger.
 - c. 51" to 84" diameter: Pairs of 1-1/2" x 16 gage strap.

3.2 INSTALLATION OF DAMPERS

- A. Install barometric dampers in accordance with manufacturer's instructions. Locate at approximately 8' AFF.

3.3 ADJUSTING AND CLEANING

- A. Clean breechings internally during installation to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth.

END OF SECTION

SECTION 26 00 50 - ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. It is the responsibility of the electrical contractor to notify the Office of the State Electrical Inspector at the State Construction Office to schedule required inspections including rough-in, above ceiling and final inspections.
- B. All work, materials, etc., shall be furnished and installed, whether or not specifically shown on the drawings and/or called for in the specifications, which may be necessary to comply with all of the requirements, due to the exigencies of the work, to complete the work and the contract in a satisfactory and approved manner.
- C. The work to be done under this contract shall consist of furnishing all equipment, labor, materials required for the items listed in the proposal, and/or as shown on the contract drawings, together with all devices, connectors, splices and appurtenances, required for a safe, clean, complete and ready for service, reliable, substantial and rugged working installation, to the satisfaction of the Engineer and to execute the intent of this contract and these specifications.
- D. The Contractor shall be responsible for determining the proper connection points for all power, control, and signal wiring installed under this contract, regardless of whether the connection points are in equipment furnished under this contract, existing equipment, or equipment furnished by others. The Contractor shall include in his bid prices any field surveys, wire tracing or other work required to ascertain the proper connection points for all wiring.
- E. It is the intent of these specifications that the Contractor shall furnish equipment and material which is suitable for the purpose and for installation in the location as is.
- F. It is also the intent of the specification that the equipment, materials, and accessories, as furnished, shall be complete in all respect and ready to operate.
- G. The specifications cover the general design, construction arrangement, and certain particular features, but do not purport to cover all details entering into the design of the equipment and accessories.
- H. Minor revisions in construction details will be made to accommodate equipment proposed and approved on the drawings thereof, submitted by the Contractor. Major revisions shall not be made, nor shall equipment be submitted for approval which cannot be installed in structures of the approximate dimensions and character specified herein.
- I. Further, it is also the intent of these specifications to provide a complete contract including items which may be omitted or not shown but which are considered normal and accepted engineering practice for this type of contract at no additional cost to the Owner.
- J. All work shall be done in a thorough and workmanlike manner and shall conform to the best modern practice in the manufacture and installation of high-grade equipment and materials. Wherever possible, all parts shall be made according to standard gauge to

facilitate replacement and repair.

- K. All materials furnished under these items shall be the best of their respective kinds and shall be free from defects in design and workmanship.
- L. All materials or equipment not meeting the specified requirements, as determined by the Designer, shall be rejected, and shall be replaced at once by the Contractor with materials or equipment of the specified type and quality, at no cost to the Owner.
- M. All materials for which no detailed specifications are given herein shall be of the quality and character best adapted and suitable for the purpose for which they are to be used and shall be subject to the approval of the Engineer.
- N. Where any material or article or the maker or distributor thereof is specified by name, this is done for the purpose of more clearly describing the type or quality desired. Any material or article of equal quality, merit and performance, in the opinion of the Engineer, will be acceptable, if approval is given in writing.
- O. All materials furnished and work done by the Contractor shall be subject to the inspection of the Engineer. Defective materials shall be removed from the site of the work and defective work repaired or replaced as directed. Facilities for handling and inspection of materials and equipment and for access to the work in progress, shall at all times be furnished by the Contractor.
- P. Where any delay is encountered in carrying out work due to unfavorable operating conditions, the Contractor shall not be entitled to additional compensation therefore, but the time allowed equivalent to the period of actual delay.

1.2 DESCRIPTION OF WORK

- A. Work includes all labor and electrical equipment to install the HVAC system.
- B. Unless specifically dimensioned, the work shown on the drawings is diagrammatic, and is intended only to show general arrangement.
- C. Include in the work, all accessories and devices necessary for the intended operation or perfection of any system, whether or not specifically shown or specified.
- D. The term "Furnish" shall mean to obtain and supply to the job site. The term "Install" shall generally mean to fix in position and connect for use. Where language indicates that one party or trade is to "install" and another is to "connect", the term "install" shall mean only to fix in position, and "connect" shall mean to make electrical connections to. The term "Provide" shall mean to furnish and install.
- E. Furnish all documentation, such as shop drawings, as-built drawings, operation and maintenance manuals, certification and perform all required testing as herein specified.
 - 1. Testing & Start-Up: Assist MC in startup of all equipment. Provide As-Built Documentation, start-up and test protocol.
 - 2. As Built Documentation: Provide a minimum of (4) sets of Ring Binders per each system with the following minimal content:
 - a. Floorplans, Partial Floorplans
 - b. Elevations of Control Cabinets
 - c. General schematic and detailed loops wiring diagrams and associate termination lists for the basement and 1st floor wiring.

- d. CD with all programming and conclusive documentation. Every line of code shall be properly commented to facilitate future debugging and modifications.

1.3 STANDARD OF QUALITY

- A. The specifications establish the standards of quality required, either by description or by references, to brand name, name of manufacturers or manufacturer's model number. All materials shall be new unless noted otherwise.
- B. Where one product only is specifically identified by name or manufacturer's model number, the Contractor shall base his bid on the use of the named product. Where multiple names are used, the Contractor shall base his bid on the use of any of those products named.

1.4 SUBMITTALS

- A. Engineer's review of shop drawings is solely for the benefit of the Owner and in no way relieves the contractor from his obligations to furnish materials which satisfy the requirements of his contract and the design intent.
- B. Shop drawings, product data and samples shall be submitted as required by the General Conditions or Project Requirements and as supplemented by this section.
- C. When a specific specification section identifies that no submittal is required, the contractor shall provide the specified materials without submittals.
- D. Provide to the Engineer, a schedule of shop drawing submissions identifying submittal target dates.
- E. The Contractor shall review, approve and submit shop drawings, with promptness so as to cause no delay in his work or in that of others. No submissions will be accepted by the Engineer without the signed review and approval of the Contractor.
- F. The Contractor shall check and verify pertinent field measurements, and quantities of equipment and materials required.

1.5 PROTECTION OF WORK

- A. Each Contractor is responsible for the protection of his materials, equipment, and completed work as defined in the General or Project Requirements and as supplemented herein.
- B. All openings into any part of the conduit systems, all fixtures and equipment must be securely covered or otherwise protected to prevent damage due to dropped tools or materials, work by others or intrusion of grit, dirt, water, snow, ice or other foreign matter. Remove burrs, dirt, paint spots and debris. The Contractor shall be held responsible for all damage done to unprotected work or materials.

1.6 STEEL AND CONCRETE WORK FOR ELECTRICAL EQUIPMENT

- A. Steel: Provide all miscellaneous steel supports and anchors required for equipment and materials installed under this Specification. Manual of Construction by American Institute of Steel Construction latest edition shall be followed in design and construction except that the second sentence of paragraph 4.2.1., Section 4 of Division

5, page 5-177 will not apply. Structural steel members shall conform to ASTM A36 and shall have a shop applied coat of rust inhibiting paint. Welding of steel shall conform to American Welding Society, Standard Code for Arc and Gas Welding in Building Construction. Bolts, nuts and washers for structural steel framing and concrete embedment shall be high tensile type minimum 3/4" diameter conforming to ASTM A325. Slotted-steel channel supports shall have flange edges turned toward web, and 9/16-inch diameter slotted holes at a maximum 2 inches o.c., in webs.

- B. Channel depth: 2-1/2 inches minimum.
- C. Channel thickness: selected to suit structural loading.
- D. Fittings and Accessories: Products of the same channel manufacturer. Channel supports and fittings shall be hot dip galvanized steel.

1.7 COUNTERFLASHING

- A. Where conduits or other items pass through any roof, wall or other exterior component, provide counter flashing as required.

1.8 EQUIPMENT BY OTHERS

- A. Summary of Work, together with other technical sections in the Project Manual, describe equipment that will be furnished by the Owner or from other sources.
- B. The responsibility for setting, installation and protection of such equipment will be defined in other sections of the Project Manual.
- C. Provide services rough-in for and make final connections to this equipment as shown and specified.
- D. Provide coordination to assure clearances required for moving equipment to final location.

1.9 MOVING OF EQUIPMENT

- A. Verify that electrical equipment will pass through all restricting openings, and when equipment or sections of equipment are larger than these openings, install this equipment prior to construction of enclosing walls, floors, or roofs.
- B. Use planking or cribbing as required to protect adjoining construction from damage.
- C. Provide rigging and expert rigging personnel as required for equipment installation in difficult locations. Rigging shall include any necessary structural investigation and temporary structural support.

1.10 CUTTING AND PATCHING

- A. Provide all openings through walls, floors, and ceilings, etc. required for the installation of work defined on the drawings and specifications.
- B. Following installation and testing, restore floors, walls and ceilings with materials equal to the original construction and finish to match existing surfaces.

- C. Cutting and patching shall be performed only by tradesmen familiar with the construction involved.

1.11 IDENTIFICATION

- A. Nameplates:
 - 1. Provide each new normal power load break switch, automatic transfer switch, starter, circuit breaker, panel, remote start-stop station, pilot light or safety switch with an engraved laminated black and white phenolic nameplate, white letters on black background. Provide similar emergency and normal/emergency equipment with an engraved laminated red and white phenolic nameplate, white letters on red background.
 - 2. Compose the legend so as to clearly indicate the function of the equipment. Letters and numbers to be at least 3/16 inch high.
 - 3. Locate the nameplate in a position so as to be clearly visible and secure with screws. Rivets and adhesives are not acceptable.
 - 4. Submit proposed nameplate legend for review.
- B. Stenciling:
 - 1. Paint bright red, all exposed pull/splice boxes, conduits, duct banks and raceways containing high voltage conductors over 600 volts.
 - 2. Provide 1 inch high stenciling, white letters on red background as follows: "HIGH VOLTAGE **** VOLTS"
 - 3. The stenciling shall occur 10 feet on center on each side of the raceway and on the front face of pull/splice box.

1.12 FINAL ACCEPTANCE

- A. The Contractor shall perform and complete work in accordance with the Contract Documents without fault or defect of any kind. In the absence of more specific directives, the work shall:
 - 1. Be completed in a first-class manner.
 - 2. Be placed in a thoroughly clean and unmarred condition.
 - 3. Be checked out in a step-by-step manner to ascertain that fastenings, controls, parts, safety devices, operating devices and other required appurtenances have been provided in accordance with the Contract Documents.
 - 4. Be free of previously condemned or rejected parts and be properly restored to an acceptable condition.
 - 5. Be adjusted for proper operation wherever adjustments or calibrations exist in the work.
- B. All systems shall be operated to demonstrate that the requirements of the Contract have been met and that the systems have been adjusted and will operate in accordance therewith.

1.13 OPERATING AND MAINTENANCE INSTRUCTIONS

See Specification 017800.

1.14 PERMITS, FEES AND CERTIFICATES OF APPROVAL

- A. Not Used.
- B. Contractor shall provide all power, labor and instruments required for tests and cleaning of systems.

- C. Whenever tests are required, three (3) copies of the test reports shall be submitted to the Engineer.
- D. Tests may be observed by the Engineer or his representative. Notify the Engineer a minimum of three weeks in advance of test dates.

1.15 COMPLIANCE WITH CODES, STANDARDS AND REGULATIONS

- A. In the absence of specific instruction in the technical specifications, equipment and installation shall conform to the following applicable codes, standards and regulations, latest editions:
 - 1. American Society for Testing and Materials (ASTM)
 - 2. American National Standard Institute (ANSI)
 - 3. Underwriter's Laboratories, Inc. (UL)
 - 4. American Welding Society Code (AWSC)
 - 5. NFPA 70, "National Electrical Code", latest edition
 - 6. National Electrical Manufacturer's Association (NEMA).
 - 7. Occupational Safety and Health Act (OSHA).
 - 8. National Fire Protection Association (NFPA).
 - 9. National Electrical Safety Code (NESC)
 - 10. National Building Code (BOCA)
 - 11. Institute of Electrical and Electronics Engineers (IEEE)
 - 12. Illuminating Engineering Society of North American (IESNA)
 - 13. State and Local Building, Electric, and Fire Codes and Regulations.

1.16 PAINTING

- A. Cabinet trims and similar prefabricated equipment shall be factory primed and finish painted with baked enamel in color selected. This equipment shall not be painted in the field unless the factory finishes have been marred or as otherwise directed. Do not paint over UL or similar labels or mechanical/electrical nameplates.

1.17 COORDINATION OF WORK

- A. Coordinate installation of conduit runs and equipment with other trades and conditions in the building and participate in all coordinated shop drawings. Variance from work shown on drawings will be subject to approval. Where interference occurs and electrical work is directed to be relocated, provide such relocation without additional cost.
- B. It is the Contractor's responsibility to coordinate with the manufacturers of all new and existing pieces of equipment the different aspects of their interfaces. All additional costs for equipment manufacturer's redesign of interfaces caused by the Contractor's failure to properly coordinate all aspects of the interfaces shall be borne by the Contractor.

1.18 ACCESS PANELS

- A. Furnish access panels where required, to concealed pull boxes, junction boxes, or similar equipment located above dry wall board ceiling or behind walls. Installation of access panels shall be by mechanics of the pertinent trade under General Construction.
- B. Access panels shall be 18" x 18" minimum, 16 gage wall or ceiling frame and a 14-gage panel door with not less than 1/8" fire proofing secured to the inside of the door.

The door shall be provided with concealed hinges and cylinder lock, and prime-coated steel prepared for painting. Each door shall be capable of opening 180 degrees. Doors for wall panels shall be secured with suitable clips and counter sunk tamperproof screws.

- C. Access panels shall have "label" fire rating equal to the ceiling or wall surface.

1.19 WARRANTY

- A. The contractor and equipment manufacturers shall jointly guarantee all wiring and equipment to be free of defects in workmanship and material for a period of one year from the date of final acceptance, unless otherwise noted.

1.20 PROJECT RECORD DOCUMENTS

- A. Maintain at job site, one copy of record documents and samples as required under the General Conditions of the Contract, including Drawings, Specifications, Addenda And Bulletins, Change Orders, Shop Drawings, Product Data and Samples, Field Orders, Field Test Records and Maintenance and Operating Manuals.
- B. Provide files and racks for storage of documents. Maintain documents in a clean, dry legible condition and in good order. Do not use record documents for construction purposes. Make record documents and samples available during normal working hours for inspection.
- C. Recording:
 - 1. Label each document "Project Record" in neat large letters and provide final completion date.
 - 2. Record information concurrently with construction progress.
 - 3. Do not conceal any work until required information is recorded.
- D. Record Drawings - legibly mark to record actual construction as follows:
 - 1. A print set (blue-line or black-line) of contract drawing or shop drawing mark-ups of actual installations which vary substantially from the work as originally shown. Mark whichever drawing is most capable of showing "field" condition fully and accurately; however, where shop drawings are used for mark-up, record a cross reference at corresponding location on working drawings. Mark with red erasable pencil and, where feasible, use other colors to distinguish between variation in separate categories or work. Mark-up new information, which is recognized to be of importance to Owner, but was for some reason not shown on either contract drawings or shop drawings. Give particular attention to concealed work which would be difficult to measure and record at a later date. Note related change order numbers where applicable.
 - 2. Record Specifications and Addenda, Bulletins, Requests for Information (RFI's) and Construction Clarification Sketches (CSK's) - legibly mark each Section to record:
 - 3. Any variations in actual work in comparison with text of specifications and modifications as issued. Give particular attention to substitutions, selection of options, and similar information work where it is concealed or cannot otherwise be readily discerned at a later date by direct observations. Note related record drawing information and product data, where applicable.
 - 4. Changes made by Field Order or by Change Order.
- E. Product Data: Maintain one copy of each product data submittal, and mark-up significant variation in actual work in comparison with submitted information.

1. Include both variations in product as delivered to site, and variations from manufacturer's instruction and recommendations for installation.
 2. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned at a later date by direct observations. Note related change orders and mark-up of record drawings and specifications.
- F. Record Drawings Submittal at Project Completion: Organize record drawing sheets into manageable sets, bind with durable paper cover sheets and print suitable titles, dates and other identification on cover of each set. Transfer marking required by previous paragraphs to set of reproducible transparencies. Submit complete set of transparencies to the Design Professional and two sets of blue-line prints.
- G. Product Data Submittal at Project Completion: Submit three sets of marked-up product data submittals for record purposes that include resolution of all review notes and field revisions.
- H. Record Sample Submittals: Immediately prior to date of preliminary final inspection Design Professional (and including Owner's personnel where desired) will meet with Contractor at site and will determine which if any of submitted samples maintained by Contractor during progress of work are to be transmitted to Owner for record purposes. Comply with Design Professionals instruction for packaging, identification marking, and delivery to Owner's sample storage space.
- I. Miscellaneous Record Submittals: Refer to other sections of these specification for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the work. Immediately prior to date(s) of final inspection, complete miscellaneous records and place in good order properly identified and bound or filed, ready for continued use and reference. Submit to Architect/Engineer for Owner's records.
- J. Maintenance Manuals: Organize maintenance-and-operating manual information into three suitable sets of manageable size and bind into individual binders properly identified and indexed (thumb-tabbed). Include: emergency instructions; spare parts listing; warranties; wiring diagrams; recommended "turn-around" cycles; inspection and cleaning procedures; recommended frequency of testing, adjustment and any other maintenance requirements; shop drawings; product data; and similarly applicable information. Bind each manual of each set in heavy duty 2-inch, vinyl-covered ring binder, and include pocket folders for folded sheet information. Mark identification on both front and spine for each binder.

END OF SECTION

SECTION 26 00 75 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes electrical identification materials and devices required to comply with ANSI C2, NFPA 70, OSHA standards, and authorities having jurisdiction.

1.3 SUBMITTALS

- A. No submittals.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with ANSI A13.1 and NFPA 70 for color-coding.
- D. Comply with NC SCO Electrical Guidelines, 2017.
- E. Comply with WCU Design and Construction Standards, Section D50 – Electrical.

PART 2 - PRODUCTS

2.1 RACEWAY AND CABLE LABELS

- A. Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color with ANSI A13.1, Table 3, for minimum size of letters for legend and for minimum length of color field for each raceway and cable.
- C. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl with legend over-laminated with a clear, weather- and chemical-resistant coating.
- D. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.
- E. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (0.08 mm thick by 25 to 51 mm wide).
- F. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

- G. Aluminum, Wraparound Marker Bands: Bands cut from 0.014-inch- (0.4-mm-) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

2.2 NAMEPLATES AND SIGNS

- A. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- B. Engraved Plastic Nameplates and Signs: Engraving stock, melamine plastic laminate, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.
 - 1. Engraved legends consistent with facility standard.
 - 2. Punched or drilled for mechanical fasteners.
- C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for the application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nameplate material colors shall be:
 - 1. Fire Alarm System: Bright red surface with white core
 - 2. Telephone/Data System: Orange surface with white core
 - 3. Sound System: Dark Blue with white core
 - 4. Security System: Dark red (burgundy) surface with white core
 - 5. Emergency System: Green surface with white core
 - 6. Data Systems: Brown surface with white core
 - 7. Paging System: White surface with black core
 - 8. TV System: Purple surface with white core
 - 9. 208 Volt System: Blue surface with white core
 - 10. 480 Volt System: Black surface with white core

2.3 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength: 50 lb (22.3 kg) minimum.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: According to color-coding.
- B. Paint: Formulated for the type of surface and intended use.
 - 1. Primer for Galvanized Metal: Single-component acrylic vehicle formulated for galvanized surfaces.
 - 2. Primer for Concrete Masonry Units: Heavy-duty-resin block filler.
 - 3. Primer for Concrete: Clear, alkali-resistant, binder-type sealer.
 - 4. Enamel: Silicone-alkyd or alkyd urethane as recommended by primer manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Identification Materials and Devices: Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other

designations with corresponding designations in the Contract Documents or with those required by codes and standards. Use consistent designations throughout Project.

- C. Sequence of Work: If identification is applied to surfaces that require finish, install identification after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before applying.
- F. Install painted identification according to manufacturer's written instructions and as follows:
 - 1. Clean surfaces of dust, loose material, and oily films before painting.
 - 2. Prime surfaces using type of primer specified for surface.
 - 3. Apply one intermediate and one finish coat of enamel.
- G. Color Banding Raceways and Exposed Cables: Band exposed and accessible raceways of the systems listed below:
 - 1. Bands: Pretensioned, wraparound plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 - 2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
 - 3. Apply the following colors to the systems listed below:
 - a. Fire Alarm System: Bright Red.
 - b. Telephone/Data System: Orange
 - c. Sound System: Dark Blue.
 - d. Security: Dark Red (Burgundy)
 - e. Emergency Systems: Green
 - f. Data Systems: Brown
 - g. Paging Systems: White
 - h. TV Systems: Purple
 - i. 208 Volt System: Blue.
 - j. 480 Volt System: Black
- H. Caution Labels for Indoor Boxes and Enclosures for Power and Lighting: Install pressure-sensitive, self-adhesive labels identifying system voltage with colors:
 - 1. 208 VAC: Blue with White background
 - 2. 480 VAC: Black with White background.
- I. Circuit Identification Labels on Boxes, Switches, and Receptacles: Install labels externally.
 - 1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
 - 2. Concealed Boxes: Plasticized card-stock tags.
 - 3. Labeling Legend: Permanent, waterproof listing of panel and circuit number/equivalent.
- J. Color-Coding of Secondary Phase Conductors: Use the following colors for service feeder, and branch-circuit phase conductors:
 - 1. 208/120-V Conductors:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 - d. Neutral: White

2. 480/277-V Conductors:
 - a. Phase A: Brown.
 - b. Phase B: Orange.
 - c. Phase C: Yellow.
 - d. Neutral: Gray.
 3. Factory-apply color the entire length of conductors, except the following field applied, color coding methods may be used instead of factory-coded wire for sizes larger than No. 10 AWG:
 - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Use 1 inch (25-mm-) wide tape in colors specified. Adjust tape bands to avoid obscuring cable identification markings.
 - b. Colored cable ties applied in groups of three ties of specified color to each wire at each terminal or splice point starting 3 inches (76 mm) from the terminal and spaced 3 inches (76 mm) apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.
- L. Power Circuit Identification: Metal tags or aluminum, wraparound marker bands for cables, feeders, and power circuits in vaults, pull and junction boxes, manholes, and switchboard rooms.
1. Legend: 1/4-inch- (6.4-mm-) steel letter and number stamping or embossing with legend corresponding to indicated circuit designations.
 2. Tag Fasteners: Nylon cable ties.
 3. Band Fasteners: Integral ears.
- M. Apply identification to conductors as follows:
1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
 2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding to identify circuits' voltage and phase.
 3. Multiple Control and Communication Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.
- N. Apply warning, caution, and instruction signs as follows:
1. Warnings, Cautions, and Instructions: Install to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
 2. Emergency Operation: Install engraved laminated signs with white legend on red background with minimum 3/8-inch- (9-mm-) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.
- O. Equipment Identification Labels: Engraved plastic laminate. Install on each unit of equipment, including central or master unit of each system. This includes power, lighting, communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high lettering on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment using mechanical fasteners:
1. Panelboards, electrical cabinets, and enclosures.

2. Access doors and panels for concealed electrical items.
3. Disconnect switches.
4. Enclosed circuit breakers.
5. Motor starters.
6. Contactors.
7. Remote-controlled switches.
8. Control devices.

END OF SECTION

SECTION 26 01 20 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

1.3 SUBMITTALS

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.4 QUALITY ASSURANCE

- A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled" as defined in NDPA 70, Article 100.
 - 2. Listing and Labeling Agency Qualifications: "Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment".
- B. Comply with NFPA 70.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

- A. Coordinate layout and installation of cables with other installations.
- B. Revise locations and elevations from those indicated, as required to suit field conditions and as approved by Engineer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 CONDUCTORS AND CABLES

- A. Manufacturers:
 - 1. American Insulated Wire Corp.; a Leviton Company.
 - 2. General Cable Corporation.
 - 3. Rome Cable Company.
- B. Refer to Part 3 "Conductor and Insulation Applications" Article for insulation type, cable construction, and ratings.
- C. Conductor Material: Copper complying with NEMA WC 5 or 7; solid conductor for No. 10 AWG and smaller, stranded for No. 8 AWG and larger.
- D. Conductor Insulation Types: Type THHN-THWN, XHHW and XHHW-2 complying with NEMA WC 5 or 7.
- E. Multi-conductor Cable: Armored or MC cable is not permitted.

2.3 CONNECTORS AND SPLICES

- A. Manufacturers:
 - 1. AFC Cable Systems, Inc.
 - 2. AMP Incorporated/Tyco International.
 - 3. Hubbell/Anderson.
 - 4. O-Z/Gedney; EGS Electrical Group LLC.
 - 5. 3M Company; Electrical Products Division.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR AND INSULATION APPLICATIONS

- A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or flexible metal conduit where permitted for connections to devices not exceeding 3' in length. .
- F. Branch circuit homeruns exposed or concealed: Type THHN-THWN, single conductors in EMT or RMC.
- G. Fire Alarm NAC Circuits: Type THHN-THWN, in EMT conduit. SAC: Fire Alarm

installer may use standard cables that comply with NEC Article 760. Armor flex may be used for connections to equipment not exceeding 3' in length.

- H. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- I. Flexible metal conduit shall be used at all equipment locations subject to vibration. Length shall not exceed 6' for power feeds and 36" for control devices.
- J. MC/AC cables are not permitted except in existing walls with permission of the Engineer and NC SCO.

3.2 INSTALLATION

- A. Conceal conduits in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Support cables according to Division 260500 Section "Common Work Results."
- F. Seal around cables penetrating fire-rated elements according to "Firestopping Penetration Details" on drawings.
- G. Identify and color-code conductors and cables according to Division 260075 Section "Electrical Identification."

3.3 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B. Use calibrated torque tool per NEC Art 110.13(D).
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.

3.4 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality-control testing:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test for compliance with requirements.
 - 2. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.
- B. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

END OF SECTION

SECTION 26 01 30 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Related Sections include the following:
 - 1. Not Used
 - 2. Division 260500 Section "Common Work Results" for supports, anchors, and identification products.
 - 3. Division 262726 Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RMC: Rigid Metal Conduit.
- F. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

1.6 COORDINATION

- A. Coordinate layout and installation of raceways, boxes, enclosures, cabinets, and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 METAL CONDUIT AND TUBING

- A. Manufacturer:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 4. Electri-Flex Co.
 - 5. Grinnell Co. /Tyco International; Allied Tube and Conduit Div.
 - 6. LTV Steel Tubular Products Company.
 - 7. Manhattan/CDT/Cole-Flex.
 - 8. O-Z Gedney; Unit of General Signal.
 - 9. Wheatland Tube Co.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Compression type.
- E. FMC: Zinc-coated steel.
- F. LFMC: Flexible steel conduit with PVC jacket.
- G. Fittings: NEMA FB 1; compatible with conduit and tubing materials.

2.3 METAL WIREWAYS

- A. Manufacturer:
 - 1. Hoffman.
 - 2. Square D.
- B. Material and Construction: Sheet metal sized and shaped as indicated, NEMA 1 or 3R.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- D. Wireway Covers: Screw cover type, Flanged and gasketed type at exterior.
- E. Finish: Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Finish with manufacturer's standard grey finish coat.
 - 1. Manufacturer:
 - a. Walker Systems, Inc.; Wiremold Company (The).
 - b. Wiremold Company (The); Electrical Sales Division.
- B. Types, sizes, and channels as indicated and required for each application, with fittings that match and mate with raceways.

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturer:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. Emerson/General Signal; Appleton Electric Company.
 - 3. Erickson Electrical Equipment Co.
 - 4. Hoffman.
 - 5. Hubbell, Inc.; Killark Electric Manufacturing Co.
 - 6. O-Z/Gedney; Unit of General Signal.
 - 7. RACO; Division of Hubbell, Inc.
 - 8. Robroy Industries, Inc.; Enclosure Division.
 - 9. Scott Fetzer Com.; Adalet-PLM Division.
 - 10. Spring City Electrical Manufacturing Co.
 - 11. Thomas & Betts Corporation. Walker Systems, Inc.; Wiremold Company
 - 12. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Floor Boxes: Cast metal, fully adjustable, rectangular.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- H. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic, finished inside with radio frequency resistant paint.
- I. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage and include accessory feet where required for freestanding equipment.

2.6 FACTORY FINISHES

- A. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard prime-coat finish ready for field painting.

- B. Finish: For raceway, enclosure, or cabinet components, provide manufacturer's standard gray paint applied to factory-assembled surface raceways, enclosures, and cabinets before shipping.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors:
 - 1. Exposed: Rigid steel or IMC.
 - 2. Concealed: Rigid steel or IMC.
 - 3. Underground, Single Run: RMC or RNC.
 - 4. Underground, Grouped: RMC or RNC.
 - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 - 6. Boxes and Enclosures: NEMA 250, Type 3R or 4.
- B. Indoors:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.
 - 4. Damp or Wet Locations: Rigid steel conduit.
 - 5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Damp or Wet Locations: NEMA 250, Type 4.
 - 6. Where subject to damage, use rigid steel or IMC.
- C. Minimum Raceway Size: 3/4-inch trade size (DN 21)
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
- E. Install nonferrous conduit or tubing for circuits operating above 60 Hz.

3.2 INSTALLATION

- A. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- B. Complete raceway installation before starting conductor installation.
- C. Support raceways as specified in Division 260500 Section "Common Work Results."
- D. Install temporary closures to prevent foreign matter from entering raceways.
- E. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portions of bends are not visible above the finished slab.
- F. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise

indicated.

1. Install concealed raceways with a minimum of bends in the shortest practical distance, considering type of building construction and obstructions, unless otherwise indicated.
- H. Raceways Embedded in Slabs: Install in middle 1/3 of slab thickness where practical and leave at least 2 inches of concrete cover.
1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 2. Space raceways laterally to prevent voids in concrete.
 3. Run conduit larger than 1-inch trade size parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 4. Change from nonmetallic tubing to rigid steel conduit, or IMC before rising above the floor.
- I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
1. Run parallel or banked raceways together on common supports.
 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- J. Join raceways with fittings designed and approved for that purpose and make joints tight.
1. Use insulating bushings to protect conductors.
- K. Terminations:
1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.
 2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.
- L. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- N. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches above the floor. Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.
- O. Flexible Connections: Use maximum of 72 inches of flexible conduit for recessed and

semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

- P. MC/AC cable is not permitted except in existing walls with Architect's permission.
- Q. Surface Raceways: Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.
- R. Set floor boxes level and flush with finished floor surface.
- S. Set floor boxes level. Trim after installation to fit flush with finished floor surface.
- T. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.2 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Preliminary Final Inspection.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.3 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Supporting devices for electrical components.
 - 2. Cutting and patching for electrical construction.
 - 3. Touchup painting.

1.3 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 - 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.
- C. Coordinate electrical service connections to existing transformer.
 - 1. Coordinate installation and connection of exterior underground utilities and services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel.
- C. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-

diameter slotted holes at a maximum of 2 inches o.c., in webs.

1. Channel Thickness: Selected to suit structural loading.

- D. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- E. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- F. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- G. Expansion Anchors: Carbon steel wedge or sleeve type.
- H. Toggle Bolts: All steel springhead type.

2.2 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Selection of Supports: Comply with manufacturer's written instructions.
- D. Strength of Supports: Adequate to carry present and future loads, times a safety

factor of at least four; minimum of 200-lb design load.

3.3 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.
- G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Simultaneously install vertical conductor supports with conductors.
- J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. Wood: Fasten with wood screws or screw type nails.
 - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid

- masonry units.
- 3. New Concrete: Concrete inserts with machine screws and bolts.
- 4. Existing Concrete: Expansion bolts.
- 5. Light Steel: Sheet metal screws.
- 6. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof test load.

3.4 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.5 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Supporting devices for electrical components.
 - 2. Cutting and patching for electrical construction.
 - 3. Touchup painting.

3.6 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
 - 1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
 - 2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
 - 3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 4. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.7 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Preliminary Final Inspection.
- C. Protect all open device boxes from painter's sprays.

END OF SECTION

SECTION 26 05 10 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field Test Reports: Submit written test reports to include the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467.

PART 2 - PRODUCTS

2.1 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Division 260120 Section "Conductors and Cables."
- B. Material: Copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated.
- B. Install an insulated green copper equipment ground in all branch circuits and feeders.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage. Conductors shall be in EMT conduit, bond conduit at both ends with approved bonding bushings and #6.
- B. Bonding Straps and Jumpers: Install so vibration by equipment mounted on vibration isolation hangers and supports is not transmitted to rigidly mounted equipment. Use exothermic-welded connectors for outdoor locations, unless a disconnect-type connection is required; then, use a bolted clamp. Bond straps directly to the basic structure taking care not to penetrate any adjacent parts. Install straps only in locations accessible for maintenance.

3.4 CONNECTIONS

- A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - 4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.
 - 5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

- B. Equipment Grounding Conductor Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- C. Noncontact Metal Raceway Terminations: If metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically non-continuous conduits at entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- D. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturers published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
- E. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

END OF SECTION