REECE, NOLAND & McELRATH, INC.

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Canton, North Carolina 28716

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SPECIFICATIONS

FOR

HENDERSON COUNTY ANIMAL SHELTER HVAC REPLACEMENT

HENDERSONVILLE, NORTH CAROLINA

March 15, 2024

NOTICE TO BIDDERS

Proposals will be received by Henderson County, *in the offices of Reece, Noland & McElrath, Inc., Engineers, 390 Main St., Canton, NC 28716* up to 3:00 p.m., on Wednesday, April 17, 2024, and immediately opened for the furnishing of labor, material and equipment for the Henderson County Animal Shelter HVAC Replacement. Bids may be mailed to the address above, for receipt prior to bid date and time. *A formal bid opening will not be held, so attendance by bidders is not required or expected. A bid tabulation will be issued summarizing the bids* Complete plans and contract documents will be available from the office of Reece, Noland & McElrath, Inc., Engineers, 390 Main St., Canton, North Carolina on March 20, 2024.

A **mandatory** pre bid conference for BIDDERS will be held at 10:00 a.m. on Tuesday, April 2, 2024, at Henderson County Animal Shelter. All Contractors planning to bid the project are required to attend.

The Scope of Work is to remove existing the existing split system heat pumps and replace with roof mounted packaged equipment. The work will require setting new units, new roof penetrations, and connecting the new units to the existing ductwork. New roof access steps and platforms will be added to allow for compliance with the North Carolina Mechanical Code for service access on roofs.

All contractors are hereby notified that they must have proper license under the state laws governing their respective trades. Contractors are notified that provisions of Chapter 87, General Statutes of North Carolina, will be observed in receiving and awarding contracts.

A single contract will be accepted for HVAC, Electrical, and General Construction work. The HVAC / Mechanical contractor shall be the prime contractor.

Each proposal shall be accompanied by a cash deposit or a certified check, drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, of an amount equal to not less than 5 per cent of the proposal, or in lieu thereof a bidder may offer a bid bond of 5 per cent of the bid executed by a surety company licensed under the laws of North Carolina to execute such bonds, conditioned that the surety will upon demand forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract in accordance with the bid bond. Said deposit shall be retained by the Owner as liquidated damages in event of failure of the successful bidder to

execute the contract within ten days after the award or to give satisfactory surety as required by law.

Performance Bond and Payment Bond will be required for one hundred per cent (100%) of the contract price.

Payment will be made monthly on the basis of completion of work, with retainage in accordance with NC General Statutes 143-134-1.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of 45 days.

The Owner reserves the right to reject any or all bids and to waive minor irregularities.

Any addenda to specifications issued during the time of bidding are to be considered covered in the proposal and in closing a contract they will become a part thereof. It shall be the bidder's responsibility to ascertain prior to bid time the addenda issued and to see that his bid includes any changes thereby required. Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the Designer in writing who will send written instructions in the form of addenda to all bidders. Notification should be not later than seven (7) days prior to the date set for receipt of bids. Neither the Owner nor the Designer will be responsible for any oral instructions. All addenda shall be acknowledged by the bidders on the Form of Proposal. Requests for substitutions of materials or equipment shall be submitted by prospective bidders in writing to the Designer not later than seven (7) days prior to the date set for receipt of bids. Approvals to bid equivalent products will be issued in addenda.

Henderson County Facility Services

Hendersonville, North Carolina

HENDERSON COUNTY ANIMAL SHELTER HVAC REPLACEMENT

HENDERSON COUNTY, NORTH CAROLINA

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INSTRUCTIONS TO BIDDERS

For a proposal to be considered it must be in accordance with the following instructions:

1. PROPOSALS

Proposals must be made in strict accordance with the Form of Proposal provided herein, and all blank spaces for bids, alternates and unit prices shall be properly filled in. When requested alternates are not bid, the proposal may be considered incomplete. The bidder agrees that bid on Form of Proposal detached from specifications will be considered and will have the same force and effect as if attached thereto. Photocopied or faxed proposals will not be considered. Numbers shall be stated both in writing and in figures for the base bids and alternates. Any modifications to the Form of Proposal (including alternates and/or unit prices) will disqualify the bid and may cause the bid to be rejected.

The contractor shall fill in the Form of Proposal as follows:

a. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.

b. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co─Partner" appearing after the name of the partner executing them.

c. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.

d. If the proposal is made by a joint venture, it shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable.

e. All signatures shall be properly witnessed.

f. If the contractor's license is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the proposal. The title "Licensee" shall appear under his/her signature.

Proposals shall be addressed as indicated in the Advertisement for Bids and shall be delivered enclosed in an opaque sealed envelope, marked "Proposal" and bearing the title of the work, name of the bidder, and the bidder's license number, if required. Bidders shall clearly mark on the outside of the bid envelope which contract(s) they are bidding.

It shall be the specific responsibility of the bidder to deliver his bid to the proper official at the appointed place and prior to the announced time for the opening of bids. Later delivery of a bid for any reason, including delivery by the United States Postal Service, shall disqualify the bid.

Modifications of previously deposited bids will be acceptable only if delivered in writing or by telegram or fax to the place of the bid opening prior to the time for opening bids. Telegraphic and fax modifications must be confirmed in writing within 72 hours of the opening of bids.

Unit prices quoted in the proposal shall include overhead and profit and shall be the full compensation for the contractor's cost involved in the work. See General Conditions, Article 19c—1.

The Identification of Minority Business Participation and either Affidavit A or Affidavit B shall be submitted with the proposal, in the same envelope as the proposal.

The proposal shall be accompanied by the Bid Security, in the same envelope as the proposal, and as described elsewhere in the Instructions to Bidders.

2. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a bid the contractor acknowledges that he has carefully examined all documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site, and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the material to be encountered, the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work, the general and local conditions, the construction hazards, and all other matters, including, but not limited to, the labor situation which can in any way affect the work under the contract, and including all safety measures required by the

Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a proposal the contractor acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications and other contract documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with other contractors performing work on the site.

Reference is made to contract documents for the identification of those surveys and investigation reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the designer in preparing the documents. The owner will make copies of all such surveys and reports available to the bidder upon request.

Each bidder may, at his own expense, make such additional surveys and investigations as he may deem necessary to determine his bid price for the performance of the work. Any on─site investigation shall be done at the convenience of the owner. Any reasonable request for access to the site will be honored by the owner.

3. BULLETINS AND ADDENDA

Any addenda to drawings or specifications issued during the time of bidding are to be considered covered in the proposal and in closing a contract they will become a part thereof. It shall be the contractor's responsibility to ascertain prior to bid time the addenda issued and to see that his bid includes any changes thereby required.

Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the designer who will send written instructions in the form of addenda to all bidders. Notification should be no later than seven (7) days prior to the date set for receipt of

bids. Neither the owner nor the designer will be responsible for any oral instructions.

All addenda shall be acknowledged by the bidder(s) on the Form of Proposal.

4. BID SECURITY

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond in an amount equal to not less than five percent (5%) of the proposal, said deposit to be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law.

Bid bond shall be conditioned that the surety will, upon demand, forthwith make payment to the obligee upon said bond if the bidder fails to execute the contract. The owner may retain bid securities of any bidder(s) who may have a reasonable chance of award of contract for the full duration of time stated in the Notice to Bidders. Other bid securities may be released sooner, at the discretion of the owner. All bid securities (cash or certified checks) shall be returned to the bidders promptly after award of contracts, and no later then seven (7) days after expiration of the holding period stated in the Notice to Bidders. Standard Form of Bid Bond is included in these specifications.

5. RECEIPT OF BIDS

Bids shall be received in strict accordance with requirements of the General Statutes of North Carolina. Bid security shall be required as prescribed by statute. Prior to opening of any bids on the project, any bidder will

be permitted to change or withdraw his bid.

6. OPENING OF BIDS

Upon opening, all bids shall be read aloud. Once any bid is opened, there shall not be any withdrawal of bids by any bidder and no bids may be returned by the designer to any bidder. After the bid opening, a bidder may request that his bid be withdrawn from consideration without forfeiture of his bid security in accordance with the provisions of the North Carolina General Statutes. After the opening of bids, no bid may be withdrawn, except under the provisions of General Statutes, for a period of thirty days unless otherwise specified. Should the successful bidder default and fail to execute a contract, the contract may be awarded to the next lowest and responsible bidder. The owner reserves the unqualified right to reject any and all bids. Reasons for rejection may include, but shall not be limited to, the following:

a. If the Form of Proposal furnished to the bidder is not used or is altered.

b. If the bidder fails to insert a price for all bid items, alternate and unit prices requested.

c. If the bidder adds any provisions reserving the right to accept or reject any award.

d. If there are unauthorized additions or conditional bids, or irregularities of any kind which tend to make the proposal incomplete, indefinite or ambiguous as to its meaning.

e. If the bidder fails to complete the proposal form where information is requested so the bid may be properly evaluated by the owner.

f. If the unit prices contained in the bid schedule are unacceptable to the owner.

g. If the bidder fails to comply with other instructions stated herein.

7. BID EVALUATION

The award of the contract will be made to the lowest responsible bidder as soon as practical. The owner may award on the basis of the base bid and any alternates the owner chooses.

Before awarding a contract, the owner may require the apparent low bidder to qualify himself to be a responsible bidder by furnishing any or all of the following data:

a. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the owner.

b. A listing of completed projects of similar size.

c. Permanent name and address of place of business.

d. The number of regular employees of the organization and length of time the organization has been in business under present name.

e. The name and home office address of the surety proposed and the name and address of the responsible local claim agent.

f. The names of members of the firms who hold appropriate trade licenses, together with license numbers.

Failure or refusal to furnish any of the above information, if requested, shall constitute a basis for disqualification of any bidder.

In determining the lowest responsible bidder, the owner shall take into consideration the past performance of the bidder on construction contracts for the owner with particular concern given to completion times, quality of work, cooperation with other contractors, and cooperation with the designer and owner.

Should the owner adjudge that the apparent low bidder is not the lowest responsible bidder by virtue of the above information, said apparent low bidder will be so notified and his bid security shall be returned to him.

8. PERFORMANCE BOND

The successful bidder, upon award of contract, shall furnish a performance bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

9. PAYMENT BOND

The successful bidder, upon award of contract, shall furnish a payment bond in an amount equal to 100 percent of the contract price. See Article 35, General Conditions.

10. PAYMENTS

Payments to the successful bidders (contractors) will be made on the basis of monthly estimates. See Article 31, General Conditions.

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ARTICLE 1 ─ DEFINITIONS

a. The contract documents; consist of the Notice to Bidders; Instructions 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 proposal; the contract; the performance bond; the payment bond; insurance certificates. All of these items together form the contract.

b. The owner; is the agency named in the contract.

c. 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. They will be referred to hereinafter as if each were of the singular number, masculine gender.

d. The contractor;, as referred to hereinafter, shall be deemed to be either of the several contracting parties called the "Party of the First Part" in either of the several contracts in connection with the total project. Where, in special instances hereinafter, a particular contractor is intended, an adjective precedes the word "contractor," as "general," "heating," etc.

e. A subcontractor; as the term is used herein, shall be understood to be one who has entered into a direct contract with a contractor, and includes one who furnishes materials worked to a special design in accordance with plans and specifications covered by the contract, but does not include one who only sells or furnishes materials not requiring work so described or detailed.

f. Written notice; shall be defined as notice in writing delivered in person to the contractor, or to a partner of the firm in the case of a partnership, or to a member of the contracting organization, or to an officer of the organization in the case of a corporation, or sent to the last known business address of the contracting organization by registered mail.

g. Work, as used herein as a noun, is intended to include materials, labor and workmanship of the appropriate contractor.

h. The project; is the total construction work to be performed under the contract documents by the several contractors.

i. Project expediter, as used herein, shall be that contractor so designated in the contract documents. The project expediter shall have the following responsibilities:

1. Schedule the work of all contractors.

2. Maintain a project progress schedule for all contractors.

3. Give adequate notice to all contractors to ensure efficient continuity of all phases of the work.

4. Notify the designer of any changes in the project schedule.

j. Change order, as used herein, shall mean a written order to the contractor subsequent to the signing of the contract authorizing a change in the contract. The change order shall be signed by the contractor, designer, and the owner, in that order (Article 19).

k. Time of completion, as stated in the contract documents, is to be interpreted as consecutive calendar days measured from the date established in the written Notice to Proceed, or such other date as may be established herein (Article 23).

l. Liquidated damages, as stated in the contract documents, is an amount reasonably estimated in advance to

cover the losses incurred by the owner by reason of failure of the contractor(s) to complete the work within the time specified.

m. Surety;, as used herein, shall mean the bonding company or corporate body which is bound with and for the contractor, and which engages to be responsible for the contractor and his acceptable performance of the work.

ARTICLE 2 ─ INTENT AND EXECUTION OF DOCUMENTS;

a. 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.

b. The wording of the specifications shall be interpreted in accordance with common usage of the language except that words having a commonly used technical or trade meaning shall be so interpreted in preference to other meanings.

c. The contractor shall execute each copy of the proposal, contract, performance bond and payment bond as follows:

1. If the documents are executed by a sole owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person executing them.

2. If the documents are executed by a partnership, that fact shall be evidenced by the word "Co─Partner" appearing after the name of the partner executing them.

3. If the documents are executed on the part of a corporation, they shall be executed by either the president or the vice president and attested by the secretary or assistant secretary in either case, and the title of the office of such persons shall appear after their signatures. The seal of the corporation shall be impressed on each signature page of the documents.

4. If the documents are made by a joint venture, they shall be executed by each member of the joint venture in the above form for sole owner, partnership or corporation, whichever form is applicable to each particular member.

5. All signatures shall be properly witnessed.

6. If the contractor's license is held by a person other than an owner, partner or officer of a firm, then the licensee shall also sign and be a party to the contract. The title "Licensee" shall appear under his/her signature.

7. The bonds shall be executed by an attorney─in─fact. There shall be attached to each copy of the bond a certified copy of power of attorney properly executed and dated.

8. Each copy of the bonds shall be countersigned by an authorized individual agent of the bonding company licensed to do business in North Carolina. The title "Licensed Resident Agent" shall

appear after the signature.

9. The seal of the bonding company shall be impressed on each signature page of the bonds.

10. The contractor's signature on the performance bond and the payment bond shall correspond with that on the contract.

ARTICLE 3 ─ CLARIFICATIONS AND DETAIL DRAWINGS;

a. In such cases where the nature of the work requires clarification by the designer, such clarification shall be furnished by the designer with reasonable promptness by means of written instructions or detail drawings, or both. Clarifications and drawings shall be consistent with the intent of contract documents, and shall become a part thereof.

b. The contractor(s) and the designer shall prepare, if deemed necessary, a schedule fixing dates upon which foreseeable clarifications will be required. The schedule will be subject to addition or change in accordance with progress of the work. The designer shall furnish drawings or clarifications in accordance with that schedule. The contractor shall not proceed with the work without such detail drawings and/or written clarifications.

ARTICLE 4 ─ COPIES OF DRAWINGS AND SPECIFICATIONS;

The designer shall furnish free of charge to the contractors copies of plans and specifications as follows:

a. General contractor ─ Up to twelve (12) sets of general contractor drawings and specifications, up to six (6) sets to include drawings and specifications of all other contracts.

b. Each other contractor ─ Up to six (6) sets of the appropriate drawings and specifications, up to three (3) sets to include drawings and specifications of all other contracts.

c. Additional sets shall be furnished at cost, including mailing, to the contractor upon request by the contractor. This cost shall be stated in the bidding documents.

d. For the purposes of a single-prime contract, the contractor shall receive up to 30 sets of drawings and specifications.

ARTICLE 5 ─ SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA;

a. The contractor shall submit to the designer all shop or setting drawings, descriptive data, samples, color charts, etc., required for the work. All shop drawings shall be reviewed by the contractor and shall bear the contractor's stamp of approval before being forwarded to the designer. Shop drawings shall be submitted in triplicate in time to avoid delay of the work or any part thereof. The designer shall review the shop drawings promptly, noting desired corrections, if any, and shall return two copies to the contractor within twenty (20) calendar days after receipt from the contractor. The contractor shall furnish corrected drawings in triplicate to the designer. Two copies of approved drawings shall be returned to the contractor.

b. Approval of shop drawings by the designer shall not be construed as relieving the contractor from responsibility for compliance with the design or terms of the contract documents nor from responsibility for errors of

any sort in the shop drawings, unless such lack of compliance or errors first have been called in writing to the attention of the designer by the contractor.

ARTICLE 6 ─ WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE;

a. The contractor shall maintain, in readable condition at his job office, 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 designer or his authorized representative.

b. 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 record is to be provided in full to the designer upon completion and acceptance of the project.

ARTICLE 7 ─ OWNERSHIP OF DRAWINGS AND SPECIFICATIONS;

All drawings and specifications are instruments of service and remain the property of the Owner. The use of these instruments on work other than this contract without permission of the owner is prohibited. All copies of drawings and specifications other than contract copies shall be returned to the owner upon request after completion of the work.

ARTICLE 8 ─ MATERIALS, EQUIPMENT, EMPLOYEES;

a. The contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials,

tools, apparatus, lights, power, 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. Substitution of materials, items or equipment of equal or equivalent design shall be submitted to the architect or engineer for approval or disapproval; such approval or disapproval shall be made by the architect or engineer prior to the opening of bids.

e. Each contractor shall obtain written approval from the designer for the use of substitute products, materials or equipment claimed as equal to those specified. Such approvals must be obtained as soon after contract awards as possible and before any materials are ordered. Applications for approvals shall be made by the contractor and not by subcontractors or material suppliers. The contractor shall submit within twenty (20) days following award of contract a complete list of materials proposed for the job. When this list is approved, no further substitutions will be permitted except in unusual or extenuating circumstances. If no list is submitted, the contractor shall supply materials specified.

f. The designer is the judge of equality for proposed substitution of products, materials or equipment.

g. If at any time during the construction and completion of the work covered by these contract documents, the conduct 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.

ARTICLE 9 ─ ROYALTIES, LICENSES AND PATENTS;

It is the intention of the contract documents that the work covered herein will not constitute in any way infringement of any patent whatsoever unless the fact of such patent is clearly evidenced herein. The contractor shall protect and save harmless the owner against suit on account of alleged or actual infringement. The contractor shall pay all royalties and/or license fees required on account of patented articles or processes, whether the patent rights are evidenced hereinafter.

ARTICLE 10 ─ PERMITS, INSPECTIONS, FEES, REGULATIONS;

a. The contractor shall 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. See Instructions to Bidders, Paragraph 3, Bulletins and Addenda. Any necessary changes required after contract award shall be made by change order in accordance with Article 19. 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 designer, he shall bear all cost arising therefrom. Additional requirements implemented after bidding will be subject to equitable negotiations.

b. All work under this contract shall conform to the North Carolina State Building Code and other state, local and national codes as are applicable. The cost of all required inspections and permits shall be the responsibility of the contractor.

c. Project is subject to county and municipal building codes and inspection by local authorities. These permits and inspections shall be paid by the contractor.

ARTICLE 11 ─ PROTECTION OF WORK, PROPERTY AND THE PUBLIC;

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 claims against the owner. All contractors shall have access to the project at all times.

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.

d. The contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations by building substantial boxes around same. 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.

g. The contractor shall designate a responsible member of his organization as safety inspector, whose duties shall include accident prevention on the work project. The name of the safety inspector shall be made known to the designer at the time the work is started.

h. 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 19(c).

ARTICLE 12 ─ SEDIMENTATION POLLUTION CONTROL ACT OF 1973;

a. Any land─disturbing activity performed by the contractor(s) in connection with the project shall comply with all erosion control measures set forth in the contract documents and any additional measures which may be required in order to ensure that the project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title 15, North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A, 4B and 4C, as amended (15 N.C.A.C. 4A, 4B and 4C).

b. Upon receipt of notice that a land─disturbing activity is in violation of said act, the contractor(s) shall be responsible for ensuring that all steps or actions necessary to bring the project in compliance with said act are promptly taken.

c. The contractor(s) shall be responsible for defending any legal actions instituted pursuant to N.C.G.S. 113A-64 against any party or persons described in this article.

d. To the fullest extent permitted by law, the contractor(s) shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, civil penalties, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance of work or failure of performance of work, provided that any such claim, damage, civil penalty, loss or expense is attributable to a violation of the Sedimentation Pollution Control Act. Such obligation shall not be construed to negate, abridge or otherwise reduced any other right or obligation of indemnity which would otherwise exist as to any party or persons described in this article.

ARTICLE 13 ─ INSPECTION OF THE WORK;

a. It is a condition of this contract that the work shall be subject to inspection during normal working hours by the designer, designated official representatives of the owner, and those persons required by state law to test special work for official approval. The contractor shall therefore provide safe access to the work at all times for such inspections.

b. All instructions to the contractor will be made only by or through the designer or his designated project representative. Observations made by official representatives of the owner shall be conveyed to the designer for review and coordination prior to issuance to the contractor.

c. Where special inspection or testing is required by virtue of any state laws, instructions of the designer, specifications or codes, the contractor shall give adequate notice to the designer of the time set for such inspection or test, if the inspection or test will be conducted by a party other than the designer. Such special tests or inspections will be made in the presence of the designer, or his authorized representative, and it shall be the contractor's responsibility to serve ample notice of such tests.

d. All laboratory tests shall be paid by the owner unless provided otherwise in the contract documents except the general contractor shall pay for laboratory tests to establish design mix for concrete, and for additional tests to prove compliance with contract documents where materials have tested deficient except when the testing laboratory did not follow the appropriate ASTM testing procedures.

e. Should any work be covered up or concealed prior to inspection and approval by the designer, such work shall be uncovered or exposed for inspection, if so requested by the designer in writing. Inspection of the work will be made promptly upon notice from the contractor. All cost involved in uncovering, repairing, replacing, recovering and restoring to design condition, the work that has been covered or concealed will be paid by the contractor involved.

f. If any other portion of the work has been covered which the designer has not specifically requested to observe prior to being covered, the designer may request to see such work and it shall be uncovered by the contractor. If such work be found in accordance with the contract documents, the cost of uncovering and replacement shall, by appropriate change order, be charged to the owner. If such work be found not in accordance with the contract documents, the contractor shall pay such costs unless it be found that this condition was caused by the owner or a separate contractor as provided in Article 15, in which event the owner or the separate contractor shall be responsible for the payment of such costs.

ARTICLE 14 ─ CONSTRUCTION SUPERVISION;

a. Throughout the progress of the work, each contractor shall keep on the job a competent superintendent or supervisory staff satisfactory to the designer. The superintendent shall not be changed without the consent of the designer unless said superintendent ceases to be employed by the contractor or ceases to be competent. The

superintendent shall have authority to act on behalf of the contractor, and instructions, directions or notices given to him shall be as binding as if given to the contractor. However, important directions, instructions and notices will be confirmed in writing to the contractor as will all such items if requested by the contractor.

b. The contractor shall examine and study the drawings and specifications and fully understand the project design, and shall provide constant and efficient supervision to the work. Should he discover any discrepancies of any sort in the drawings or specifications, he shall report them to the designer without delay. He will not be held responsible for discrepancies in the drawings and/or specifications, but shall be held responsible to report them should they become known to him.

c. All contractors shall be required to cooperate and consult with each other during the construction of this project. Each contractor shall lay out and execute his work so as to cause the least delay to other contractors. Each contractor shall be responsible for any damage to other contractor's work, and each contractor shall be financially responsible to the another contractors for undue delay caused by him to other contractors on the project.

d. The contractor is required to attend monthly job site progress conferences as called by the designer. The contractor shall be represented at these job progress conferences by both home office and project personnel. These representatives shall have authority to act on behalf of the contractor. These meetings shall be open to subcontractors, material suppliers and any others who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the project on schedule and to complete the project within the specified contract time. Each contractor shall be prepared to assess progress of the work as required in his particular contract and to recommend remedial measures for correction of progress as may be appropriate. The designer or his authorized representative shall be the coordinator of the conferences and shall preside as chairman.

e. The contractor(s) shall, if required by the Supplementary General Conditions, employ a registered engineer or registered land surveyor to lay out the work and to establish a bench mark nearby in a location where same will not be disturbed and where direct instruments sights may be taken.

f. The designer shall designate a project expediter on projects involving two or more prime contracts. The project expediter shall be designated in the Supplementary General Conditions.

g. It shall be the responsibility of the project expediter to cooperate with and obtain from the several contractors on the job their respective schedules and to integrate them into a project progress schedule that will show graphically, by a detailed bar chart, CPM or other acceptable and approved methods, the projected progress of the job from start to finish and within the allotted time frame. All contractors shall review the proposed progress schedule and approve same in writing to the designer and the project expediter.

h. The progress schedule shall be presented to the designer no later than thirty (30) days after written notice to proceed. No application for payment will be processed until this schedule is received.

i. The schedule will be distributed to all contractors and displayed at the job site.

j. The several contractors shall be responsible for their schedule and must notify the project expediter of any changes or adjustments to their schedule. The project expediter shall maintain the progress schedule, making monthly adjustments, updates, corrections, etc., that are necessary, keeping all contractors and the designer fully informed. Failure to provide an updated schedule may be grounds for withholding reduction of retainage as set forth in Article 31.

k. The project expediter shall notify each contractor of such events or time frames that are critical to the progress of the job. Such notice shall be timely and reasonable. Should the progress be delayed due to the work of any of the several contractors, it shall be the duty of the project expediter to immediately notify the contractor(s) responsible for such delay, the designer, the State Construction Office and other prime contractors. The designer shall notify the bonding company that the progress is not being maintained and shall make a recommendation to the owner regarding further action.

l. Designation as project expediter entails an additional project control responsibility and does not alter in any way the responsibility of the contractor so designated, nor the responsibility of the other contractors involved in the project.

ARTICLE 15 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS;

a. Chapter 143, Article 8, General Statutes of North Carolina, requires separate contracts to be awarded for the general construction, heating and ventilating and air conditioning, plumbing, and electrical installations. The owner reserves the right to prepare separate specifications, receive separate bids, and award separate contracts for such other major items of work as may be in the best interest of the owner. Chapter 143, Article 8, was amended June 28, 1989, to allow public contracts to be bid in the alternative as multi-prime or single-prime contracts.

b. All contractors shall cooperate with each other in the execution of their work, and shall plan their work in such manner as to avoid conflicting schedules or delay of the work. See Article 14, Construction Supervision.

c. If any part of contractor's work depends upon the work of another contractor, defects which may affect that

work shall be reported to the designer in order that prompt inspection may be made and the defects corrected. Commencement of work by a contractor where such condition exists will constitute acceptance of the other contractor's work as being satisfactory in all respects to receive the work commenced, except as to defects which may later develop. The designer shall be the judge as to the quality of work and shall settle all disputes on the matter between contractors.

d. Any mechanical or electrical work such as sleeves, inserts, chases, etc., which is located in the work of the general contractor shall be built in by the general contractor. The respective mechanical and electrical contractors shall set all sleeves, inserts and other devices built into the structure in cooperation and under the supervision of the general contractor. The responsibility for the exact location of such items shall be that of the mechanical and/or electrical contractor.

e. Should a contractor cause damage to the work or property of another contractor, he shall be directly responsible, and upon notice, shall promptly settle the claim or otherwise resolve the dispute.

ARTICLE 16 ─ SUBCONTRACTS AND SUBCONTRACTORS;

a. Within fourteen (14) days after award of the contract, the contractor shall submit to the designer a list giving the names and addresses of subcontractors and equipment and material suppliers he proposes to use, together with the scope of their respective parts of the work. Should any subcontractor be disapproved by the designer, the designer shall submit his reasons for disapproval in writing to the owner for its consideration with a copy to the contractor. If the owner concurs with the designer's recommendation, the contractor shall submit a substitute for approval. The designer shall act promptly in the approval of subcontractors, and when approval of the list is given, no changes of subcontractors will be permitted except for cause or reason considered justifiable by the designer.

b. The designer will furnish to any subcontractor, upon request, evidence regarding amounts of money paid to the contractor on account of the subcontractor's work.

c. 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.

d. The owner reserves the right to limit the amount of portions of work to be subcontracted as hereinafter specified.

ARTICLE 17 ─ CONTRACTOR AND 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, and that payments to subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 titled Interest on final payments due to prime contractors: payments to subcontractors.

a. On all public construction contracts which are let by a board or governing body of the state government or any political subdivision thereof, except contracts let by the Department of Transportation pursuant to G.S. 136─28.1, the balance due prime contractors shall be paid in full within 45 days after respective prime contracts of the project have been accepted by the owner, certified by the architect, engineer or designer to be completed in

accordance with terms of the plans and specifications, or occupied by the owner and used for the purpose for which the project was constructed, whichever occurs first. Provided, however, that whenever the architect or consulting engineer in charge of the project determines that delay in completion of the project in accordance with terms of the plans and specifications is the fault of the contractor, the project may be occupied and used for the purposes for which it was constructed without payment of any interest on amounts withheld past the 45 day limit. No payment shall be delayed because of the failure of another prime contractor on such project to complete his contract. Should final payment to any prime contractor beyond the date such contracts have been certified to be completed by the designer or architect, accepted by the owner, or occupied by the owner and used for the purposes for which the project was constructed, be delayed by more than 45 days, said prime contractor shall be paid interest, beginning on the 46th day, at the rate of one percent (1%) per month or fraction thereof unless a lower rate is agreed upon on such unpaid balance as may be due. In addition to the above final payment provisions, periodic payments due a prime contractor during construction shall be paid in accordance with the payment provisions of the contract documents or said prime contractor shall be paid interest on any such unpaid amount at the rate stipulated above for delayed final payments. Such interest shall begin on the date the payment is due and continue until the date on which payment is made. Such due date may be established by the terms of the contract. Where a conditional acceptance of a contract exists, and where the owner is retaining a reasonable sum pending correction of such conditions, interest on such reasonable sum shall not apply.

b. Within seven days of receipt by the prime contractor of each periodic or final payment, the prime contractor shall pay the subcontractor based on work completed or service provided under the subcontract. Should any periodic or final payment to the subcontractor be delayed by more than seven days after receipt of periodic or final payment by the prime contractor, the prime contractor shall pay the subcontractor interest, beginning on the eighth day, at the rate of one percent (1%) per month or fraction thereof on such unpaid balance as may be due.

c. The percentage of retainage on payments made by the prime contractor to the subcontractor shall not exceed the percentage of retainage on payments made by the owner to the prime contractor. Any percentage of

retainage on payments made by the prime contractor to the subcontractor that exceeds the percentage of retainage on payments made by the owner to the prime contractor shall be subject to interest to be paid by the prime contractor to the subcontractor at the rate of one percent (1%) per month or fraction thereof.

d. Nothing in this section shall prevent the prime contractor at the time of application and certification to the owner from withholding application and certification to the owner for payment to the subcontractor for unsatisfactory job progress; defective construction not remedied; disputed work; third-party claims filed or reasonable evidence that claim will be filed; failure of subcontractor to make timely payments for labor, equipment and materials; damage to prime contractor or another subcontractor; reasonable evidence that subcontract cannot be completed for the unpaid balance of the subcontract sum; or a reasonable amount for retainage not to exceed the initial percentage retained by owner.

ARTICLE 18 ─ DESIGNER'S STATUS;

a. The designer shall provide general administration of the performance of construction contracts, including liaison and necessary inspection of the work to ensure compliance with plans and specifications. He is the agent of the owner only for the purpose of constructing this work and to the extent stipulated in the contract documents. He has authority to stop work or to order work removed, or to order corrections of faulty work where such action may be necessary to assure successful completion of the work.

b. The designer is the impartial interpreter of the contract documents, and, as such, he shall exercise his powers under the contract to enforce faithful performance by both the owner and the contractor, taking sides with neither.

c. Should the designer cease to be employed on the work for any reason whatsoever, then the owner shall employ a competent replacement who shall assume the status of the former designer.

d. The designer will make periodic inspections of the project at intervals appropriate to the stage of construction. He will inspect the progress, the quality and the quantity of the work.

e. The designer and the owner shall have access to the work whenever it is in preparation and progress during normal working hours. The contractor shall provide facilities for such access so the designer may perform his functions under the contract documents.

f. Based on the designer's inspections and evaluations of the project, the designer shall issue interpretations, directives and decisions as may be necessary to administer the project. His decisions relating to artistic effect and technical matters shall be final, provided such decisions are within the limitations of the contract.

ARTICLE 19 ─ CHANGES IN THE WORK;

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 WRITTEN ORDER FROM THE DESIGNER, COUNTERSIGNED BY THE OWNER AUTHORIZING SUCH CHANGE. AND NO CLAIM FOR ADJUSTMENTS OF THE CONTRACT

PRICE SHALL BE VALID UNLESS THIS PROCEDURE IS FOLLOWED.

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, 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.

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. 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 may be required, 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.

e. Under Methods "c(2)" and Paragraph "d" above, the allowances for overhead and profit combined shall not exceed twenty percent (20%) of net cost except where the change involves a subcontractor, allowance shall not exceed fifteen percent (15%) for the subcontractor, and ten percent (10%) for the prime contractor. 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 "d" above, the contractor shall include no less than ten percent (10%) profit, but no allowances for overhead.

f. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein may include all items of material and labor, rental value of power tools and equipment, bond adjustments and sales tax. The allowance for labor burden which includes such items of cost as workmen's compensation insurance, unemployment insurance, special insurance, Social Security and old age benefit, and fringe benefits shall be actual costs not to exceed thirty-five percent (35%) of total labor cost. Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the owner.

g. The following items shall be considered as overhead: insurance other than mentioned above, supervision, superintendents, timekeepers, clerks, expediters, watchmen, small tools, incidental job burdens and general office expense, and all other items not included in "cost" as above defined.

h. 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 BREAKDOWN SHOWING METHOD OF ARRIVING AT NET COST AS DEFINED ABOVE.

I. In all change orders, normal procedure will be for the designer to obtain quotations and supporting data, and verify correctness. The designer shall prepare the change order, secure the contractor's signature, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. Upon approval by the Owner, one copy remains with the Owner, and the remaining copies are sent to the

designer for distribution to the contractor(s) and the surety. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.

j. 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."

k. A change order, when issued, shall be full compensation, or credit, for the extra 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.

l. If, during the progress of the work, the owner requests a change order and the contractor's terms are unacceptable, the owner without prejudice, may perform or have performed that portion of the work requested in the change order.

ARTICLE 20 ─ CLAIMS FOR EXTRA COST;

a. Should the contractor consider that as a result of any instructions given in any form by the designer, he is entitled to extra cost above that stated in the contract, he shall give written notice thereof to the designer within seven (7) days without delay, and shall not proceed with the work affected until further advised, except in emergency involving the safety of life or property, which condition is covered in Article 19(d) and Article 11(h). No claims for extra compensation will be considered unless the claim is so made. The designer shall render a

written decision within seven (7) days of receipt of claim.

b. THE CONTRACTOR SHALL NOT ACT ON INSTRUCTIONS RECEIVED BY HIM FROM PERSONS OTHER THAN THE DESIGNER, AND ANY CLAIMS FOR EXTRA COMPENSATION OR EXTENSION OF TIME ON ACCOUNT OF SUCH INSTRUCTION WILL NOT BE HONORED. The designer will not be responsible for misunderstandings claimed by the contractor of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

c. Resolution of Claims and Disputes

The Designer will review Claims and take one or more of the following preliminary actions within ten days of receipt of a Claim: (1) request additional supporting data from the claimant, (2) submit a schedule to the parties indicating when the Designer expects to take action, (3) reject the Claim in whole or in part, stating reasons for rejection, (4) recommend approval of the Claim by the other party or (5) suggest a compromise. The Designer may also, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim.

If a Claim has been resolved, the Designer will prepare or obtain appropriate documentation.

If a Claim has not been resolved, the party marking the Claim shall, within ten days after the Designer=s preliminary response, take one or more of the following actions: (1) submit additional supporting data requested by the Designer, (2) modify the initial Claim or (3) notify the Designer that the initial Claim stands.

If a Claim has not been resolved after consideration of the foregoing and of further evidence presented by the parties or requested by the Designer, the Designer will notify the parties in writing that the Designer=s decision will br made within seven days, which decision shall be final and binding on the parties but subject to arbitration. Upon expiration of such period, the Designer will render to the parties the Designer=s written decision relative to the Claim, including any change in the Contract Sum or Contract Time or both. If there is a surety and there appears to be a possibility of a Contractor=s default, the Designer may, but is not obligated to, notify the surety and request the surety=s assistance in resolving the controversy.

d. **Arbitration**

1. Controversies and Claims Subject to Arbitration. Any controversy or Claim arising out of or related to the Contract, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgement upon the award rendered by the arbitrator or arbitrators may be entered in any court having jurisdiction thereof. Such controversies or Claims upon which the Designer has given notice and rendered a decision as provided in Subparagraph C.4 shall be subject to arbitration upon written demand of either party. Arbitration may be commenced when 45 days have passed after a Claim has been referred to the Designer and no decision has been rendered.

2. Rules and Notices for Arbitration. Claims between the Owner and Contractor not resolved under Paragraph C.4 shall, if subject to arbitration under Subparagraph D.1, be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect, unless the parties mutually agree otherwise. Notice of demand for arbitration shall be filed in writing with the other party to the Agreement between the Owner and Contractor and with the American Arbitration Association, and a copy shall be filed with the Designer.

3. Contract Performance During Arbitration. During arbitration proceedings, the Owner and Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

4. When Arbitration May Be Demanded. Demand for arbitration of any Claim may not be made until the earlier of (1) the date on which the Designer has rendered a final written decision on the Claim, (2) the tenth day after the parties have presented evidence to the Designer or have been given reasonable opportunity to do so, if the Designer has not rendered a final written decision by the date.

4.1 When a written decision of the Designer states that (1) the decision is final but subject to arbitration and (2) a demand for arbitration of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand arbitration within said 30 days= period shall result in the Designer=s decision becoming final and binding upon the Owner and Contractor. If the Designer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence, but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.

4.2 A demand for arbitration shall be made within the time limits specified above as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations.

5. **Limitation on Consolidation or Joinder.** No arbitration arising out of or relating to the Contract documents shall include, by consolidation or joinder or in any other manner, the Designer, the Designer=s employees or consultants, except by written consent containing specific reference to the Agreement and signed by the Designer, Owner, CONTRACTOR and any other person or entity sought to be jointed. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, CONTRACTOR, a separate contractor and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, CONTRACTOR or a separate contractor shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a dispute not described therein or with a person or entity not named or described therein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

6. **Claims and Timely Assertion of Claims.** A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

7. **Judgment on Final Award.** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

ARTICLE 21 ─ MINOR CHANGES IN THE WORK;

The designer will have the authority to order minor changes in the work not involving an adjustment in the contract sum or time for completion, and not inconsistent with the intent of the contract documents. Such changes shall be effected by written order, and shall be binding on the owner and the contractor.

ARTICLE 22 ─ UNCORRECTED FAULTY WORK;

Should the correction of faulty or damaged work be considered inadvisable or inexpedient by the owner and the designer, the owner shall be reimbursed by the contractor. A change order will be issued to reflect a reduction in the contract sum.

ARTICLE 23 ─ TIME OF COMPLETION, DELAYS, EXTENSION OF TIME;

a. The time to be allowed for construction is stated in the Supplementary General Conditions and in the Form of Proposal. The project expediter, Article 1(I) and Article 14, upon notice of award of contract, shall confer with other contractors, prepare a construction schedule based on the allowed time, and submit such a schedule to the other contractors for approval and coordination with a copy to the designer for comment. When the schedule has been approved by all contractors, the project expediter shall distribute copies to all contractors, the designer and the owner. All contractors shall maintain progress in accordance with the schedule and with terms of the construction contract. The progress schedule shall be revised as required by the project expediter in cooperation with other contractors and the designer. See Article 14.

b. The contractors 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 hereunder within the number of consecutive calendar days stated. For each day in excess of the above number of days, the contractor(s) shall pay the owner the sum stated as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the owner by reason of failure of said contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.

c. The designer shall be the judge as to the division of responsibility between the contractor(s), based on the construction schedule, weekly reports and job records, and shall apportion the amount of liquidated damages to be paid by each of them, according to delay caused by any or all of them.

d. If the contractor is delayed at any time in the progress of his work by any act or negligence of the owner or the designer, or by any employee of either; by any separate contractor employed by the owner; by changes ordered in the work; by labor disputes at the project site; by abnormal weather conditions not reasonably anticipated for the locality where the work is performed; by unavoidable casualties; by any causes beyond the contractor's control; or by any other causes which the designer and owner determine may justify the delay, then the contract time may be extended by change order for the time which the designer and owner may determine is reasonable.

Time extensions will not be granted for rain, wind, snow or other natural phenomena of normal intensity for the locality where work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the contract period involved with the average of the preceding five (5) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where work is performed and on daily weather logs kept on the job site by the contractor reflecting the effect of the weather on progress of the work and initialed by the designer's representative. Time extensions for weather delays do not entitle the contractor to "extended overhead" recovery.

e. Request for extension of time shall be made in writing within twenty (20) days following cause of delay. In case of continuing cause for delay, only one claim is necessary.

f. The contractor shall notify his surety in writing of extension of time granted.

g. No claim shall be allowed on account of failure of the designer to furnish drawings or instructions until two (2) weeks after demand for such drawings and/or instructions. See Article 3.

ARTICLE 24 ─ PARTIAL UTILIZATION: BENEFICIAL OCCUPANCY;

a. The owner may desire to occupy all or a portion of the project when the work is substantially complete.

b. Prior to the final payment, the owner may request the contractor(s) in writing, through the designer if applicable, to permit him to use a specified part of the project which he believes he may use without significant interference with construction of the other parts of the project. If the contractor(s) agree, the designer will schedule a beneficial occupancy inspection, after which the designer may issue a certificate of substantial completion. The certificate shall include the following documentation:

1. Date of substantial completion.

2. A tentative list of items to be completed or corrected before final payment.

3. Establishing responsibility between contractor and owner for maintenance, heat, utilities and insurance.

4. Establishing the date for guarantees and warranties under terms of the contract.

5. Consent of surety.

6. Endorsement from insurance company permitting occupancy.

c. The owner shall have the right to exclude the contractor from any part of the project which the designer has so certified to be substantially complete, but the owner will allow the contractor reasonable access to complete or correct work to bring it into compliance with the contract.

d. Occupancy by the owner under this article will in no way relieve the contractor from his contractual requirement to complete the project within the specified time. The contractor will not be relieved of liquidated damages because of beneficial occupancy. The designer may prorate liquidated damages based on the percentage of project occupied.

ARTICLE 25 ─ FINAL INSPECTION AND ACCEPTANCE;

a. The designer shall determine when the work is completed and ready for final inspection and shall schedule a final inspection at a time and date acceptable to the owner and contractor(s).

b. When contractors finish their work prior to completion by other contractors, these contracts shall be closed out through the final inspection, acceptance and final payment process on recommendation of the designer.

c. At the final inspection, the designer shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the contract documents. At the conclusion of the final inspection, the designer shall make the following determinations:

1. That the project is completed and accepted.

2. That the project is accepted subject to the list of discrepancies (punch list). All punch list items must be completed within thirty (30) days of acceptance or the owner may invoke Article 28, Owner's Right to Do Work.

3. That the project is not complete and another date for a final inspection will be established.

d. The date of acceptance will establish the following:

1. The beginning of guarantees and warranties period.

2. The date on which the contractor's insurance coverage for public liability, property damage and builder's risk may be terminated.

3. That no liquidated damages (if applicable) shall be assessed after this date.

4. The termination date of utility cost to the contractor.

ARTICLE 26 ─ CORRECTION OF WORK BEFORE FINAL PAYMENT;

a. Any work, materials, fabricated items or other parts of the work which have been condemned or declared not in accordance with the contract by the designer shall be promptly removed from the work site by the contractor, and shall be immediately replaced by new work in accordance with the contract at no additional cost to the owner. Work or property of other contractors or the owner, damaged or destroyed by virtue of such faulty work, shall be

made good at the expense of the contractor whose work is faulty.

b. Correction of condemned work described above shall commence within twenty─four (24) hours after receipt of notice from the designer, and shall make satisfactory progress until completed.

c. Should the contractor fail to proceed with the required corrections, then the owner may complete the work in accordance with the provisions of Article 28.

ARTICLE 27 ─ CORRECTION OF WORK AFTER FINAL PAYMENT;

See Article 35, Performance Bond and Payment Bond, and Article 42, Guarantee. Neither the final certificate, final payment, occupancy of the premises by the owner, nor any provision of the contract, nor any other act or instrument of the owner, nor the designer, shall relieve the contractor from responsibility for negligence, or faulty material or workmanship, or failure to comply with the drawings and specifications. He shall correct or make good any defects due thereto and repair any damage resulting therefrom which may appear during the guarantee period following final acceptance of the work except as stated otherwise under Article 42, Guarantee. The owner will report any defects as they may appear to the contractor and establish a time limit for completion of corrections by the contractor. The owner will be the judge as to the responsibility for correction of defects.

ARTICLE 28 ─ 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 fifteen (15) 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.

ARTICLE 29 ─ 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 above 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 of such delay, neglect or default, specifying the same, and if the contractor within a period of fifteen (15) 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 surety shall fail to take over the work to be done under this contract within fifteen (15) 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 the hands 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. 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 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 shall be liable and shall pay to the owner the amount of said excess.

ARTICLE 30 ─ CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE THE CONTRACT;

a. Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three months, due to cause beyond the fault or control of the contractor, or if the owner should fail or refuse to make payment on account of a certificate issued by the designer within thirty (30) days after receipt of same, then the contractor, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the owner and the designer, may suspend operations on the work or terminate the contract.

b. The owner shall be liable to the contractor for the cost of all materials delivered and work performed on this contract plus 20 percent overhead and profit and shall make such payment. The designer shall be the judge as to the correctness of such payment.

ARTICLE 31 ─ REQUEST FOR PAYMENT;

a. Not later than the fifth day of the month, the contractor shall submit to the designer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the contractor and

the designer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract with the following information:

1. Total of contract including change orders.

2. Value of work completed to date.

3. Less five percent (5%) retainage, provided however, that after fifty percent (50%) of the work has been satisfactorily completed on schedule, with approval of the owner and written consent of the surety, further requirements for retainage will be waived only so long as work continues to be completed satisfactorily and on schedule.

4. Less previous payments.

5. Current amount due.

b. The contractor, upon request of the designer, shall substantiate the request with invoices of vouchers or payrolls or other evidence.

c. Prior to submitting the first request, the contractor shall prepare for the designer a schedule showing a breakdown of the contract price into values of the various parts of the work, so arranged as to facilitate payments to subcontractors in accordance with Article 17, Contractor and Subcontractor Relationships.

d. When payment is made on account of stored materials and equipment, such materials must be stored on the owner's property, and the requests for payments shall be accompanied by invoices or bills of sale or other evidence to establish the owner's title to such materials and equipment. Responsibility for such stored materials and equipment shall remain with the contractor regardless of ownership title. Such stored materials and equipment shall not be removed from the owner's property. Should the space for storage on-site be limited, the contractor, at his option, shall be permitted to store such materials and/or equipment in a suitable space off-site. Should the contractor desire to include any such materials or equipment in his application for payment, they must be stored in the name of the owner in a commercial warehouse approved by the designer and Owner and located as close to the site as possible. The warehouse selected must be approved by the contractor's bonding and insurance companies; the material to be paid for shall be assigned to the owner and shall be inspected by the designer. Upon approval by the designer of the storage facilities and materials and equipment, payment therefore will be certified. Responsibility for such stored materials and equipment shall remain with the contractor. Such stored materials and equipment shall not be moved except for transportation to the project site. Under certain conditions, the designer may approve storage of materials at the point of manufacture, which conditions shall be approved by the designer and the owner prior to approval for the storage and shall include an agreement by the storing party which unconditionally gives the Owner absolute right to possession of the materials at anytime. Bond, security and insurance protection shall continue to be the responsibility of the contractor(s).

e. In the event of beneficial occupancy, retainage of funds due the contractor(s) may be reduced with the approval of the Owner to an equitable amount to cover the list of items to be completed or corrected. Retainage may not be reduced to less than two and one─half (2 2) times the estimated value of the work to be completed or corrected. Reduction of retainage must be with the consent and approval of the contractor's bonding company.

ARTICLE 32 ─ CERTIFICATES OF PAYMENT AND FINAL PAYMENT;

a. Within five (5) days from receipt of request for payment from the contractor, the designer shall issue and

forward to the owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the designer. If the certificate is not approved by the designer, he shall state in writing to the contractor and the owner his reasons for withholding payment.

b. No certificate issued or payment made shall constitute an acceptance of the work or any part thereof. The making and acceptance of final payment shall constitute a waiver of all claims by the owner except:

1. Claims arising from unsettled liens or claims against the contractor.

2. Faulty work or materials appearing after final payment.

3. Failure of the contractor to perform the work in accordance with drawings and specifications, such failure appearing after payment.

4. As conditioned in the performance bond and payment bond.

c. The making and acceptance of final payment shall constitute a waiver of all claims by the contractor except those claims previously made and remaining unsettled (Article 20(c)).

d. The designer will not authorize final payment until the work under contract has been certified by designer, and certificates of compliance issued (G.S. 133─1.1).

e. Final certificate of payment shall be accompanied by the following:

1. Warranties and guarantees required by the contract.

2. Release and waiver of claim for prime contractors.

3. Affidavit of contractors of payment to material suppliers and subcontractors. (See Article 36.)

4. Certificates of state agencies required by state law.

5. Certificate of compliance by designer.

6. Consent of surety to final payment.

ARTICLE 33 ─ PAYMENTS WITHHELD;

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

1. Faulty work not corrected.

2. The unpaid balance on the contract is insufficient to complete the work in the judgment of the designer.

3. To provide for sufficient contract balance to cover liquidated damages that will be assessed.

b. The Owner may authorize the withholding of payment for the following reasons:

1. Claims filed against the contractor or evidence that a claim will be filed.

2. Evidence that subcontractors have not been paid.

c. 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.

ARTICLE 34 ─ 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 contain a provision that coverages afforded under the policies will not be canceled, 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.

a. Worker's Compensation and Employer's Liability: The contractor shall provide and maintain, during the life of the contract, worker's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of $100,000.

b. Public Liability and Property Damage: The contractor shall provide and maintain, during the life of the contract, 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
*$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: The contractor shall purchase and maintain property insurance during the life of this contract, 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 subcontractors in the work and shall insure against the perils of fire, 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.

ARTICLE 35 ─ PERFORMANCE BOND AND PAYMENT BOND;

a. Each contractor shall furnish a performance bond and payment bond executed by a surety company authorized to do business in North Carolina. The bonds shall be in the full contract amount. Bonds shall be executed in the form bound with these specifications (Section 307 and Section 308).

b. All bonds shall be countersigned by an authorized agent of the bonding company who is licensed to do business in North Carolina.

ARTICLE 36 ─ CONTRACTOR'S AFFIDAVIT;

The final payment of retained amount due the contractor on account of the contract shall not become due until the contractor has furnished to the owner through the designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or subcontracted work in connection with his contract have been satisfied, and that no claims or liens exist against the contractor in connection with this contract. In the event that the contractor cannot obtain similar affidavits from subcontractors to protect the contractor and the owner from possible liens or claims against the subcontractor, the contractor shall state in his affidavit that no claims or liens exist against any subcontractor to the best of his (the contractor's) knowledge, and if any appear afterward, the contractor shall save the owner harmless.

ARTICLE 37 ─ ASSIGNMENTS;

The contractor shall not assign any portion of this contract nor subcontract in its entirety. Except as may be required under terms of the performance bond or payment bond, no funds or sums of money due or become due the contractor under the contract may be assigned.

ARTICLE 38 ─ USE OF PREMISES;

a. The contractor(s) shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, permits or directions of the designer and shall not exceed those established limits in his operations.

b. The contractor(s) shall not load or permit any part of the structure to be loaded with a weight that will endanger its safety.

c. The contractor(s) shall enforce the designer's instructions regarding signs, advertisements, fires and smoking.

ARTICLE 39 ─ CUTTING, PATCHING AND DIGGING;

a. The contractor shall do all cutting, fitting or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other contractors shown upon or reasonably implied by the drawings and specifications for the completed structure, as the designer may direct.

b. Any cost brought about by defective or ill-timed work shall be borne by the party responsible therefor.

c. No contractor shall endanger any work of another contractor by cutting, digging or other means. No

contractor shall cut or alter the work of any other contractor without the consent of the designer and the affected contractor(s).

ARTICLE 40 ─ UTILITIES, STRUCTURES, SIGNS;

a. The project expediter shall provide necessary and adequate facilities and pay all costs for water, electricity, gas, oil, sewer and other utility services which may be necessary and required for completion of the project according to the contract documents. Any permanent meters installed shall be listed in the project expediter's name until his work is fully accepted by the owner.

b. Meters shall be relisted in the owner's name on the day following completion and acceptance of the project expediter's work, and the owner shall pay for services used after that date.

c. The owner shall be reimbursed for all metered utility service charges paid by or attributed to the owner after the meter is relisted in the owner's name and prior to completion and acceptance of the work of all contractors. Reimbursement shall be made by the contractor whose work has not been completed and accepted. If the work of two or more contractors has not been completed and accepted, reimbursement to the owner shall be paid by the contractors involved on the basis of assessments by the designer.

d. All contractors shall have the permanent building systems in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed when it has windows installed and when doorways and other openings have protection which will provide reasonable climatic control. The appropriate climatic condition shall be jointly

determined by the contractor(s) and the designer. Use of the equipment in this manner shall in no way affect the warranty requirements of the contractor(s).

e. The electrical contractor shall have the building's permanent power wiring distribution system in sufficient readiness to provide power as required by the HVAC contractor for temporary climatic control.

f. The electrical contractor shall have the building's permanent lighting system ready at the time the general contractor begins interior painting and shall provide adequate lighting in those areas where interior painting and finishing is being performed.

g. Each prime contractor shall be responsible for his permanently fixed service facilities and systems in use during progress of the work. The following procedures shall be strictly adhered to:

1. Prior to acceptance of work by the owner, each contractor shall remove and replace any parts of the permanent building systems damaged through use during construction.

2. Temporary filters shall be installed in each of the heating and air conditioning units during construction. New filters shall be installed in each unit prior to the owner's acceptance of the work.

3. Extra effort shall be maintained to keep the building clean and under no circumstances shall air systems be operated if finishing operations are creating dust in excess of what would be considered normal if the building were occupied. The designer may require that return grilles in the habitable space also be covered with filter media. The intent is to present the duct system in a clean condition at final inspection.

4. It shall be understood that any warranty on equipment presented to the owner shall extend from the day of final acceptance by the owner. The cost of warranting the equipment during operation in the finishing stages of construction shall be borne by the contractor whose system is utilized.

5. The electrical contractor shall have all lamps in proper working condition at the time of final project acceptance.

h. The project expediter shall provide, if required and where directed, a shed for toilet facilities and shall furnish and install in this shed all water closets required for a complete and adequate sanitary arrangement. These facilities will be available to other contractors on the job and shall be kept in a neat and sanitary condition at all times. Chemical toilets are acceptable.

I. The project expediter shall, if required by the Supplementary General Conditions and where directed, erect a temporary field office, complete with lights, telephone, heat and air conditioning. A portion of this office shall be partitioned off, of sufficient size, for the use of a resident inspector, should the designer so direct.

j. The project expediter will erect one sign on the project if required. The sign shall be of sound construction, and shall be neatly lettered with black letters on white background. The sign shall bear the name of the project, and the names of prime contractors on the project, and the name of the designer and consultants. Directional signs may be erected on the owner's property subject to approval of the owner with respect to size, style and location of such directional signs. Such signs may bear the name of the contractor and a directional symbol. No other signs will be permitted except by permission of the owner.

ARTICLE 41 ─ CLEANING UP;

The contractors shall keep the building 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 designer. Before final inspection and acceptance of the building, each contractor shall clean his portion of the work, including glass, hardware, fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the owner, with no cleaning required by the owner.

ARTICLE 42 ─ GUARANTEE;

a. 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.

b. 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.

c. 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 final acceptance, in accordance with applicable law.

d. Roof guarantees are stipulated in the roofing specification.

ARTICLE 43 ─ CODES AND STANDARDS;

Wherever reference is given to codes, standard specifications or other data published by regulating agencies including, but not limited to, national electrical codes, North Carolina state building codes, federal specifications, ASTM specifications, various institute specifications, etc., it shall be understood that such reference is to the latest edition including addenda published prior to the date of the contract documents.

ARTICLE 44 ─ INDEMNIFICATION;

To the fullest extent permitted by law, the contractor shall indemnify and hold harmless the owner, the designer and the agents, consultants and employees of the owner and designer, from and against all claims, damages, losses and expenses, including, but not limited to, attorneys' fees, arising out of or resulting from the performance or failure of performance of the work, provided that any such claim, damage, loss or expense (1) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission of the contractor, the contractor's subcontractor, or the agents of either the contractor or the contractor's subcontractor. Such obligation shall not be construed to negate, abridge or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this article.

ARTICLE 45 ─ TAXES;

State Use and Sales Taxes shall be included in the Bid. The Contractor shall submit each month, with his payment request, a Sales Tax Report showing Sales Tax paid, as set forth herein. Sales tax report shall be itemized on a form showing name and address of supplier, invoice number, date, material description, gross amount, State Sales Tax,

County Sales Tax, invoice total, and grand total. Sales Tax Reports shall be signed and notarized.

ARTICLE 46 ─ 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.

ARTICLE 47 ─ EMPLOYMENT OF THE HANDICAPPED;

The contractors agree not to discriminate against any employee or applicant for employment because of physical or mental handicap 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 handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

ARTICLE 48 - ASBESTOS-CONTAINING MATERIALS (ACM);

The Owner has attempted to address all asbestos-containing materials that are to be disturbed in the project. However, there may be other asbestos-containing materials in the work areas that are not to be disturbed and do not create an exposure hazard. Contractors are reminded of the requirements of instructions under Instructions to Bidders and General Conditions of the Contract, titled Examination of Conditions. Statute 130A, Article 19, amended August 3, 1989, established the Asbestos Hazard Management Program that controls asbestos abatement in North Carolina.

SUPPLEMENTARY GENERAL CONDITIONS

ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS:

Supplement:

All work shall conform to Contract Documents. No change there from shall be made without Contractor having first received permission from Engineer, in writing, to make such change. Where detailed information is lacking, Contractor, before proceeding with work, shall refer matter to Engineer who will furnish information with reasonable promptness.

If any errors or omissions appear in Contract Documents, Contractor shall, after discovering same, notify Engineer in writing of such error or omission.

Drawings for this project consist of: M100, M101, M102, M103, M104, M105 and Structural Letter

ARTICLE 3 - CLARIFICATIONS AND DETAIL DRAWINGS:

Supplement:

If, in the Contractor's opinion, any work is indicated on Drawings, or is specified in such manner as will make it impossible to produce a first-class piece of work, or should discrepancies appear between Drawings and

Specifications, he shall refer same to Engineer for interpretation before proceeding with work. If Contractor fails to make such reference, no excuse will thereafter be entertained for failure to carry out work in satisfactory manner.

Should a conflict occur in or between Drawings and Specifications, CONTRACTOR SHALL BE DEEMED TO HAVE ESTIMATED ON MORE EXPENSIVE WAY OF DOING WORK unless he shall have asked for and obtained a decision, in writing, from Engineer before submission of proposals as to which method or materials will be required.

ARTICLE 14 - CONSTRUCTION SUPERVISION:

Supplement:

Prior to and during the execution of the work, the Contractor shall check all drawings, specifications, and job conditions and shall immediately report any errors, discrepancies, conflicts and omissions found therein to the Engineer in writing and have the same explained or corrected by the Engineer before proceeding with the work. Any work done by the Contractor after these conditions have been discovered and before the Engineer has explained or made corrections shall be corrected at the Contractor's expense.

Contractor shall verify all dimensions as indicated on drawings. He shall report any errors or inconsistencies in writing above to the Engineer before commencing work and any necessary changes shall be adjusted as provided by Article 19 "Changes in the Work".

In the event that the Contractor does not verify all dimensions he shall bear the cost of any necessary changes resulting there from.

ARTICLE l5 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS:

Shall be as follows: HVAC (Single Prime)

All work, including any incidental cutting and patching, repairs to existing finishes as a result of Contractor's operations, and any other work necessary to the proper execution of this Contract shall be the responsibility of the HVAC Contractor.

ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME: **

Supplement:

The "Construction Schedule" shall be in graph form and show the date when every major operation is to begin and to be completed, the dollar value to be completed, the dollar value to be completed each month and the date when Approved shop drawings will be needed.

"Construction Schedule" shall be brought up to date and submitted each month with the application for payment.

An additional copy of the "Construction Schedule" shall be provided the Engineer for forwarding to the Owner.

All work must be completed in accordance with the Project Schedule which is described in Article 60 of these Supplementary General Conditions.

ARTICLE 31 - REQUEST FOR PAYMENT:

Supplement: The Contractor shall submit to the Engineer for approval promptly after the award of the contract, a

complete schedule of values of the various parts of the work, broken down to show labor and material. The various parts of the work shall be listed with their proportional value. This schedule shall be used for the basis for monthly payments.

The Contractor may submit to the Engineer an "Application and Certificate for Payment" on A.I.A. Form 702, each month if he wishes to be paid for work accomplished in the previous month. The Contractor shall attach to the Application any receipts or vouchers required to verify same.

The application, when approved by the Engineer, shall be certified within a reasonable time to the Owner for payment. No payment made to the Contractor by the Owner shall constitute acceptance of any work or materials not conforming to the Contract.

Revise paragraph a.3. as follows:

3. Less five percent (5%) retainage, provided however, that after fifty percent (50%) of the work has been satisfactorily completed on schedule, with approval of the Owner and written consent of the surety, retainage may be reduced to zero percent (0%) only so long as work continues to be completed satisfactorily and on schedule.

ARTICLE 39 - CUTTING, PATCHING, AND DIGGING:

Supplement:

It is the general intent of these drawings and specifications that patching of walls, floors, partitions, roofs, ceilings, or other materials necessary and required to affect the completion of work as required to install work by the contractor will be the responsibility of said contractor, except as otherwise specifically required by the accompanying drawings and specifications. The repair of all damages made by cutting shall include restoring those surfaces to their original state of finish. All such repairs shall be performed by personnel trained and proficient in the particular trades involved; i.e., plaster repairs by plasterers, masonry repairs by masons, tile repairs by tile setters, etc., who shall be approved in advance by the Engineer.

It is the intent of this specification that all areas requiring repairs shall be restored to a completely finished condition, acceptable to the Engineer and Owner, by this Contractor.

ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS:

Utilities, including electric power and water for construction purposes will be provided by the Owner from existing facilities. The Contractor shall consult with the Owner as to the source of power.

Contractor may utilize Owner designated toilet facilities within the building areas under renovation at the time as long as maintained in satisfactory sanitary condition, otherwise Contractor to provide portable toilet facilities located on site outside building.

ARTICLE 50 - MANUFACTURER'S SPECIFICATIONS AND INSTRUCTIONS:

All manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accord with manufacturer's specifications and directions, unless herein specified to the contrary.

ARTICLE 51 - PHYSICAL DATA:

The drawings have been prepared on the basis of surveys and inspections of the site and are intended to present an essentially accurate general indication of the physical conditions at the site. This, however, shall not relieve the Contractor of the necessity for familiarizing himself with the physical conditions at the site. Any discrepancies found in the drawings shall be reported to the Engineer.

The Contractors and subcontractors shall verify all levels, dimensions, angles, and conditions at the site before

ordering any material or executing any work and shall be responsible for the correctness of his measurements. Any difference which may be found, shall be submitted to the Engineer for consideration and adjustment before proceeding with the work.

ARTICLE 52 - DESCRIPTION OF PROJECT:

ARTICLE 54 - TIME OF COMPLETION AND LIQUIDATED DAMAGES:

The Contractor shall commence work to be performed under this agreement on a date to be specified in a written order from the Engineer and shall fully complete all work hereunder in accordance with the schedule outlined in Supplementary General Conditions Article 60. See General Conditions of the Contract, Article 23, regarding Construction Schedule, Delays and Extension of Time.

It is anticipated that overtime work / late shift work, and possibly weekend work may be required in order to complete this project within the specified duration. Any costs associated with overtime/weekend work are considered within the scope of work of this contract. Work schedule shall be fully coordinated with and approved by the owner. Contractor shall follow all county policies regarding safety, security, and otherwise, when working while staff is not present. Contractor shall be responsible for all resulting loss / costs that may result (both their own, as well as, the owner's) as a result of not complying with policies and agreed to procedures.

ARTICLE 55 - WORK IN OCCUPIED AREAS:

Contractor shall properly protect all furnishings and finishes in the building and stored in designated areas of the building by the Owner.

Where work is required to be done in occupied areas of the existing buildings the contractor shall consult with the Owner and arrange schedules mutually satisfactory to both parties for performing such work. Special consideration will be given to Owner's ability to schedule work in special areas or during times facilities are previously committed.

The Contractor shall take due precautions for protection of equipment and furnishings and shall expedite work to

complete same in shortest possible time and minimum disruption of normal activities of Owner. Once installation is began, it shall be completed without delay.

ARTICLE 56 - STORAGE:

Space for storage of materials and equipment will be provided and designated at the project site. The Contractor shall consult with the Owner who will designate specific areas mutually satisfactory to both parties for this purpose.

ARTICLE 57 - PARKING:

Space for parking of Contractor's cars and trucks will be allotted free of charge by the Owner at the site of the work. The Contractor shall confer with the Owner who will designate specific spaces, the location and number of which are mutually satisfactory to each.

ARTICLE 58 - INTERPRETATIONS:

When Engineer gives or makes interpretations, contractor should not assume that he is being given oral instructions to make changes. No changes will be made except by written change order duly signed by the Owner, the Engineer, and Contractor; and the Contractor should not assume approval until he receives his duly executed copy.

ARTICLE 59 - PROJECT EXPEDITER:

It shall be the responsibility of the Prime Contractor for the project to schedule the work of all sub-contractors to maintain a progress schedule for all sub-contractors for this project; and to notify the Engineer of any changes in the progress schedule. He shall be responsible for providing adequate notice to all sub-contractors to insure efficient continuity of all phases of the project work.

Project will have only one prime contractor, thus the prime contractor will be designated the project expediter.

ARTICLE 60 – PROJECT SCHEDULE:

The Contractor will be required to execute this project while portions of the facilities remain occupied throughout the construction process.

The contract period is 120 days from the Notice to Proceed. New HVAC Systems must be fully functioning, automatically, not later than July 2024. Work inside the animal shelter must be coordinated with the Owner, and must be coordinated with activities scheduled for the shelter.

ARTICLE 61 – RECYCLING:

Disposal of all material demolished from the premises, as well as all construction debris, is to be accomplished in complete accordance state law and local ordinances.

ARTICLE 62 – ALTERNATES:

HEATING, VENTILATION AND AIR CONDITIONING

DIVISION 15600

15610 GENERAL:

A. GENERAL:

This Contractor's attention is directed to the requirements of Instructions to Bidders, General Conditions and Supplementary General Conditions as bound in the specifications which apply in full to the heating, ventilation and air conditioning contract.

B. SCOPE:

Work in this section consists of furnishing of all labor, materials, equipment, and services reasonably incidental and implied for completion of the air conditioning, heating, exhaust and ventilation systems as described in these specifications and shown on the drawings, all in accordance with the contract documents. These drawings may be superseded by later revised or detailed drawings, specifications or sketches prepared by Designer and this Contractor

shall conform to all coordination requests. All items not specifically mentioned in the specifications or noted on the drawings but which obviously are required to make the working installation complete shall be included automatically.

C. CODES:

All work under this contract shall be done in accordance with the plans and specifications and all work shall comply with North Carolina Building Code, and with Underwriters' rules and regulations covering work of nature to be performed. Wherever plans or specifications are in excess of such laws, codes, regulations, etc., the plans and specification shall hold. All equipment so listed shall have U.L. label on it. All work must comply with all local codes and regulations. When more stringent requirements are imposed by governing regulations, they must be complied with.

If Contractor notes discrepancies between laws, codes, ordinances, rules and regulations and the specifications or drawings, each discrepancy shall be called to the attention of the Designer in writing before the bids are submitted.

D. PERMITS AND FEES:

This Contractor shall secure all permits required for the completion of this contract. He shall obtain and deliver to the Owner all certificates of inspection issued by the authorities having jurisdiction, with Contractor paying costs of same.

E. VISIT TO JOB SITE:

Before submitting a bid, this Contractor shall visit the job site for the purpose of thoroughly examining the site and conditions under which the work must be performed. The submission of a bona fide bid will be construed to mean that this Contractor understands and is satisfied with conditions under which the contract must be fulfilled. No extra

compensation will be allowed for situations arising from failure of the Contractor to thoroughly familiarize himself with site conditions, including charges and requirements for connection to utilities as shown for this project.

F. WORKMANSHIP:

Workmanship in the fabrication, preparation, and installation of materials and equipment shall conform to the best standards of practice of the trades involved. Work shall be performed by experienced and skilled mechanics under the supervision of a competent foreman. Substandard workmanship will be cause for rejection of work and replacement by Contractor. All costs associated with providing engineering assistance due to substandard work by the contractor shall be assumed by the contractor including time expended, telephone, and travel.

G. DRAWINGS AND SPECIFICATIONS:

The drawings show the location and arrangement of piping, ducts, and equipment, together with details of connections of certain principal items. The layout shown shall be followed as closely as circumstances will permit, but this Contractor shall lay out his work so as to avoid conflict with other Contractors, and trades, and to avoid any unnecessary cutting or damage to walls, floors, and supporting structural members. He shall, therefore, carefully and accurately locate all sleeves and install at the proper time all necessary hangers, inserts, etc., which will be required for the completion of his work and shall be solely responsible for the accurate and proper location of above items.

This Contractor shall refer to architectural, plumbing, and electrical drawings and shall cooperate fully with other Contractors and trades while installing ducts and other equipment because of close space limits. In case of conflict, notify Designer before proceeding with installation. Refer to architectural drawings for exact building dimensions and location of partition walls, doors, chases, etc. Mechanical drawings are not to be scaled for such dimensions.

Because of the small scale of mechanical drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. Contractor to investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet the conditions.

The drawings and specifications complement each other and together are intended to give a complete description of the work. Any items of equipment or note of work to be done as shown on plans and not mentioned in the specifications, or mentioned in specifications and not shown on plans, shall be furnished the same as if mentioned or shown in both places. If conflicts exist, then the most stringent method shown or described shall apply. Any switches, controls, or equipment included in this contract work (drawings and/or specifications) that is not specifically shown on drawings shall be located for convenient use and access. Contractor to coordinate all equipment arrangement and lay-out in field prior to beginning any actual installation of his work.

If Contractor notes any discrepancy, omission, or conflict found in plans or specifications, he shall call to the immediate attention of the Designer, prior to receipt of bids. After contract is awarded, no claim for extra compensation will be approved for above reasons.

It is the intention that piping, air ducts and light fixtures are designed and laid out to clear each other. It shall be the responsibility of this Contractor to coordinate his work with that of other trades to avoid any such conflicts. Any conflicts that occur after work of one trade is installed and was not prior coordinated shall be relocated or rearranged at the total expense of this Contractor, as directed by Designer. Any conflicts that cannot be corrected in field by location or elevation changes shall be report to Designer in writing prior to any installation.

Provide all labor, materials, tools, equipment, and transportation and perform all operations necessary for and reasonably incidental to proper execution and completion of all "Mechanical" work, where specifically mentioned or not, all as indicated, specified herein, and/or implied thereby to carry out the intent thereof.

H. CUTTING AND PATCHING:

This Contractor before installing any of his work shall see that it does not interfere with clearances required for finished walls, partitions, equipment, etc., as shown on mechanical, electrical and architectural drawings and details. If any work is so installed and it later develops that the architectural design cannot be followed, this Contractor shall at his own expense, make changes in his work as directed by the Designer so that the architectural design may be followed.

Any cutting or patching required by the failure of this Contractor to install sleeves, inserts, hangers, etc., at the proper time, or failure to accurately locate above items, shall be done at his own expense. This Contractor shall advise General Contractor at proper time an exact location of all roof, wall and floor openings. All such penetrations shall have sleeves.

Any cutting of walls or structures required for the installation of work under this division shall be done by this Contractor. Holes for passage of pipe and ducts shall be properly and neatly sleeved and grouted. All sleeve openings to be appropriately sealed at completion of construction. Sleeves through exterior walls shall be effectively sealed against passage of water. All disturbed areas shall be refinished and left in a finished and matching condition and must meet approval of Designer.

This Contractor shall properly firestop all floor and wall penetrations utilizing rated assemblies to provide the required fire protection. Firestopping is to be installed in strict compliance with the U.L. through-penetration firestop system(s) applicable or as shown on the plans, or an approved equal. Submit shop drawings showing manufacturer's installation details/sections for approval. Persons installing firestopping shall have on site the approved firestopping submittals during installation, and at final inspection. Firestopping shall be installed per manufacturer's installation instructions and in strict compliance with U.L. rating.

All disturbed areas shall be refinished and left in a finished and matching condition and must meet approval of Designer.

I. INSPECTIONS AND TESTS:

No piping, duct work, or other installation shall be covered up or concealed until it has been tested and inspected as called for under appropriate sections of these specifications. This Contractor shall furnish all labor, fuel, equipment or special apparatus required, and bear all expense of such tests. The Designer shall be given advance notice of time tests are to be made, so a representative may be present to observe.

J. ALLOWANCE FOR ADDED WORK:

Before proceeding with any work for which compensation may be claimed or the Owner may claim credit, a detailed estimate shall first be submitted and approved in writing. No claim for addition to the contract sum will be valid unless so ordered and approved by the Owner and Designer, prior to start of work. Any conflicts corrected by relocation or elevation changes do not constitute extra work.

K. AS INSTALLED PRINTS:

This Contractor shall maintain a set of prints, showing exact locations of all relocated equipment, concealed equipment, service accesses, dampers, underground lines, and all other changes to plans. This set shall be kept current and turned over to the Designer upon completion of the job. Show dimensions to locate all underground piping from permanent reference points.

L. STANDARDS:

All work performed and equipment furnished by this Contractor shall be in accordance with applicable standards as published by ASHRAE, ANSI, NFPA, SMACNA, ASME, and UL.

M. INCIDENTAL CONSTRUCTION WORK:

All blocking for openings, ducts and pipes in concrete floors, masonry walls or partitions shall be provided by this Contractor. This Contractor shall do all cutting and fittings of his work and of other work that may be required to make the several parts come together properly and to fit his work to receive or be received by the work of other Contractors as shown upon, or reasonably implied by the drawings and specifications. He shall properly complete and finish up his work after other Contractors have finished as the Designer may direct.

All excavating required for the installation of this system shall be done by this Contractor and shall be unclassified; and backfill shall be accomplished as specified in appropriate section of specifications. Chases are prohibited in masonry walls which are not to be plastered or paneled. Set piping and ducts indicated to be concealed in unplastered or unpaneled masonry walls before walls are constructed in order that walls may be constructed around pipes or ducts. This Contractor shall furnish and install all sleeves in floor, beams, walls, etc., for such penetration as needed for installing his work and installation by General Contractor.

Unless otherwise noted, the General Contractor will provide openings and lintels as new construction progresses, but this Contractor shall fully designate his requirements prior to construction. Failure to furnish his requirements prior to

building construction shall make this Contractor responsible for removing, replacing and painting building construction as required for installation of his work.

N. CLEANING AND PAINTING:

This Contractor shall at all times keep the Owner's premises, the adjoining premises, driveways and streets clean of rubbish caused by this Contractor's operations and at the completion of the work shall remove all the rubbish from and about the premises, all his tools, equipment temporary work, surplus material and shall leave the work clean and ready for use.

This Contractor shall be required to perform touch-up painting on all factory finished equipment installed under this contract where necessary to repair abraded or scarred areas and make a clean and neat installation at the direction of the Designer. All metal exposed to weather shall be properly painted.

After the facility is ready for operation, clean all dirt from all machinery and equipment, fans, grilles, ducts, controls, etc.

Replace (disposable type) or clean and recoat (permanent type) all filters that have been used during construction at time of final acceptance.

O. SUPERVISION:

This Contractor shall have in charge of the work at all times during construction a thoroughly competent foreman with extensive experience in the work to be performed under this contract. Any one deemed not capable by the Designer shall

be replaced immediately upon request, and after satisfactory foreman has been assigned, he shall not be withdrawn without the written consent of the Designer.

P. GUARANTEE:

This Contractor shall guarantee all materials, equipment, workmanship and each and every piece of apparatus which he furnished and which he installs under this contract against defects and failures of any nature for a period of one year from date on which the system is accepted. Apparatus furnished by this Contractor shall be guaranteed to be satisfactory when operated under rated conditions in accordance with manufacturer's instructions and to be of function, size, and capacity specified on drawings or in the specifications. Upon notice from the Designer or Owner, he shall immediately check system, make necessary repairs or adjustments as required; due to faulty workmanship, materials, stoppages, operation or equipment, without cost to the Owner, and instruct Owner in proper operation, adjustment and care of systems. Contractor to send Designer a copy of each service call work order stating problem(s), findings, corrective actions taken and any items pending or unresolved; giving anticipated scheduled date for completing.

All refrigeration compressors to have five-year warranty by manufacturer.

The initial one-year warranty shall include periodic inspections and filter changing. A report of each inspection shall be sent to the Designer. A minimum of three inspections will be made during the first twelve months after acceptance. The Owner's maintenance personnel shall be instructed regarding routine operation and maintenance of the equipment during each inspection.

Upon expiration of the initial 12 month warranty/service period, this Contractor shall offer a continuing service program to the Owner, with a copy to the Designer. The program offered shall vary in content from a minimum service policy to

a maximum full coverage policy. The Owner shall have the option to elect to use either policy or none on an annual basis for a nominal fee or none.

Q. INTERFERENCES:

This Contractor shall cooperate with all Contractors on the building and shall confer with all Contractors installing mechanical work and equipment which may effect or come in contact with this work. He shall make necessary visits to site and examination of other trades to verify dimensions, installation conditions and conflicts, storage facilities, etc.; he shall examine approved shop drawings of all trades and arrange his work in proper relationship to other work and apparatus and with the architectural finish in an approved manner.

All equipment shall be installed to provide convenient access for service. Service access shall be as required by equipment manufacturer, whether or not specifically detailed on drawings. When equipment is not accessible from the ground; catwalks, service platforms, etc. shall be provided as required to allow access to equipment for maintenance.

It is the intent that piping, air ducts and light fixtures are laid out to clear each other; it shall be the responsibility of this Contractor to coordinate his work with that of other trades to avoid any such conflicts. Any conflicts that occur after work of one trade is installed and was not prior coordinated, shall be relocated or rearranged at total expense of this Contractor, as directed by Designer. The conflicts that cannot be corrected in field by location or elevation changes shall be reported to the Designer in writing prior to an installation.

R. IDENTIFICATION:

All equipment shall be identified and properly marked. All marking must meet Designer approval. All markers shall be of appropriate size. Minimum letter height 3/16". Each panel, starter, control, valve, and other pieces of equipment shall be identified as to their service, including each component and adjustment in control panels and equipment.

Numbered tags shall be attached to each valve and referenced in operating instructions where applicable. Seaton style 2070 tags or approved equal to be utilized. Where equipment requiring adjustment, servicing or checking is located above lay-in ceiling panels, each ceiling panel is to be identified with a coded marker signifying that it provides access to that particular equipment such as control devices, adjustment dampers, fire dampers, induction boxes, fans, heaters, etc.

Ductwork: All ductwork shall be identified as to the service of the duct and the direction of flow. The letters shall be at least two inches high and the flow arrow shall be at least six inches long. The letters and flow arrow shall be made by precut stencils and black oil base paint with aerosol can. Concealed ducts need not be identified.

Piping: All piping shall be identified as to the service of the pipe and the normal direction of flow. The letters shall be one inch high on small pipe sizes and two inches high on large pipe sizes and the flow arrows shall be at least six inches long. The letters and flow arrows shall be made by precut stencils and black oil base paint with aerosol can. Concealed pipes need not be identified.

Equipment: All equipment, except in finished rooms, shall be identified by stenciling the title of the equipment as taken from the plans in a position that is clearly visible from the floor. The letters shall be made with black paint and shall be not less that two inches high. The titles shall be short and concise and abbreviations may be used as long as the meaning is clear. In finished rooms, equipment shall be identified by engraved nameplates as specified.

S. MAINTENANCE AND OPERATION INSTRUCTIONS:

Operating and Maintenance Instructions on all equipment shall be provided:

Owner's manuals: Organize owner's operation, maintenance, and installation instructions into sets of manageable size. Bind in individual heavy-duty 3-ring vinyl-covered binders of appropriate size, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Submit four (4) complete copies to the Engineer for review prior to final inspection. Include the following information, with tabs to separate information for each piece of equipment:

Submittal data

Spare parts lists

Manufacturer's operating, installation, and maintenance instructions

Copies of warranties

Wiring diagrams

Preventive maintenance procedures and frequencies

Test and balance reports

As-Built Test & Balance Drawings

As-built control drawings

Report of factory start-ups, or contractor's check-out data

Valve tag lists

Names and addresses of manufacturer's or subcontractors and suppliers.

Provide rack in each equipment room for owner's manual storage. Provide a plastic envelope on the wall of each equipment room with inspection certificates, control diagrams, elementary wiring diagrams, piping schematics, valve lists, etc.

Prior to Application for Final Payment of the contract, this Contractor shall be responsible to train owner's personnel.

Owner training: Train owner's personnel in system and equipment operation and maintenance, including normal and emergency operation, start-up and shut-down, troubleshooting procedures, repair procedures, routine preventive maintenance procedures and frequencies, normal adjustments, safety precaution, warranty terms and procedures, and assistance available from manufacturer's authorized service representatives. Training is to include review of owner's manual information described above. Where required elsewhere in these specifications, training is to be conducted by manufacturer's authorized service representative or factory representative as part of equipment start-up specified. Upon completion of training, the organization conducting training shall submit on its letterhead to the Engineer a letter stating what training was conducted, date of training, names of owner's personnel trained, and name of person conducting training.

Upon acceptance of this letter, and final inspection and approval of this project, the one year warranty period on all equipment and systems installed by this Contractor shall start, from that date.

T. ELECTRICAL WORK:

This Contractor shall furnish, and install all electrical starters, disconnect switches, thermostats, controls, and safety devices required for the proper installation and operation of equipment installed under this contract. Switches, thermostats and controls shall be located for convenient access if not specifically located on drawings.

Electrical work under this contract shall start at MDP, wiring gutter, junction box or power panel provided by Electrical Sub-Contractor for service to equipment installed under this contract. See drawings for location and type of service connections to be provided under the electrical sub-contract. Electrical contractor to be a sub-contractor to the mechanical (prime) contractor.

This Contractor shall install conduit, power and control wire and outlet boxes for thermostats and interlocks, and wiring to equipment. This Contractor will pull control wiring and furnish all items of control equipment.

Work shall be installed in accordance with the most current edition of the National Electrical Code, and as specified in Section 16 of these specifications.

U. SHOP DRAWINGS:

Upon award of the contract, this Contractor shall submit to the Designer within ten (10) days, for approval, a list of all proposed sub-contractors and materials he proposes (within the three listed manufacturers as equivalent) to utilize for approval by Designer, Contractor to include a submittal schedule/status log listing all items of submittal and shop drawings on AIA Form G712 or similar form, and within 4 weeks of approval, supply eight (8) sets of shop drawings consisting of detailed drawings or manufacturer's cuts of all manufactured equipment he proposes to use on the job. The drawings or cuts shall show details of construction and arrangement and all pertinent data pertaining to equipment proposed to be furnished. The approval of the Designer shall be obtained before equipment is ordered for delivery.

Approval of the Designer shall be for general fitness and design only and final approval of substituted equipment is contingent upon its satisfactory performance. It will be the duty of this Contractor to verify quantities, dimensions, capacity, and details, and determine suitability of equipment for installation in space provided. Approval of shop

drawings by the Designer does not relieve this Contractor of the responsibility for coordination, dimensions, quantities, capacity, features, or details. If submittal shows variations from the contract requirements, the Contractor shall note on submittal and shall describe all differences (i.e., increased amperage, horsepower, physical size, capacity, flow, etc.) in writing (on letter of transmittal) separate from notations on submittal shop drawings.

This Contractor shall check and approve shop drawings making such notations and corrections as may be appropriate or necessary to comply with specifications before submission to the Designer. Submittals with variations and/or substitutions as equivalent by the listed manufacturers as specified or by those approved as equivalent 10 days prior to bid (see Materials Section) shall also contain a statement that this Contractor has coordinated same with other Contractors and Designers affected and list any changes required, refer to Materials Section.

Shop drawings and/or submittal data shall be submitted on items listed as follows:

Insulation Materials & Insulation Methods

Exhaust Fans

Automatic Controls

Flexible Duct & Fittings

Rectangular Ductwork and Fittings

Spiral Ductwork and Fittings

Grilles, Diffusers & Air Handling Accessories

AABC Balance & Testing Forms

Louvers, Dampers, Mixing Box Dampers

Fire Dampers / Fire-stopping

Roof-Mounted / Ground-Mounted Packaged Air Handling Units

Self-Contained Heat Pump Unit

Gas Pressure Regulators, Shut-off Valves, and Flex. Connectors

Roof Curbs, Penetrations, Supports

Electric Heaters

Electrical Distribution Equipment (Disconnects, Conduit, Starters, Breakers, Wiring, etc.)

Starters, Magnetic/Manual

Transformers

Wiring Devices

Electrical Distribution Equipment

Conduit & Wire

Firestopping for all Penetrations Applicable

V. TEMPORARY UTILITIES:

All necessary utilities such as water and electricity shall be furnished by Owner during construction, from his existing facilities.

W. EXISTING FACILITIES:

In existing facilities, disruption of operations must be kept to a minimum and coordinated with Owner. Work in existing buildings must be cleaned up daily immediately after finishing that portion of work and equipment left in order for

Owner to continue operations. When it is necessary to interrupt utility services in the fulfillment of this contract, such interruptions shall be kept to a minimum and coordinated with Owner. Once work has begun, it shall be pursued diligently until completed.

Every precaution shall be taken to prevent damage to existing underground lines and structures and public utilities. Damage to existing water and sewer lines, culverts, service connections, underground cables, and similar surface and sub-surface structures shall be at the risk of this Contractor, whether or not locations thereof are show on plans, and the repairing of such damage shall be by and at the expense of this Contractor, which shall be completed without delay.

The locations of any existing underground utilities that are shown are in an approximate way only and have not been independently verified by the Owner or its representative. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the Contractor's failure to exactly locate and preserve any and all underground utilities.

X. ADAPTATION OF WORK TO EXISTING CONDITIONS:

It is reasonably implied that this Contractor is to furnish all labor and materials to provide Owner with a new and satisfactory system in these facilities. Contractor is to include necessary work for adaptation of equipment to conditions that may be found to produce conflicts during construction. When any such conditions are encountered, Contractor is to consult with Designer and then modify installation as directed without additional costs, and to include any incidental materials required.

Y. STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT:

The Mechanical Contractor shall be responsible for furnishing suitable shelter and protection of all materials and equipment stored on the job.

Equipment shall be protected from damage from any source both during storage and after installation until completion of the job. No damaged equipment will be accepted.

Z. CLEAN UP:

The Mechanical Contractor shall be responsible for keeping work areas clean and free of trash and debris resulting from his operations.

When work is conducted in occupied areas, clean up shall be accomplished daily and work areas left clean at end of day's work.

When all equipment and systems have been set and ready for use, they shall be thoroughly cleaned, removing all labels, plaster, rust and stains, checked for leaks, and left in perfect working order.

AA. DELIVERY AND HANDLING OF EQUIPMENT FURNISHED BY OTHERS:

All mechanical equipment furnished by Owner and others which is to be installed and connected by the Mechanical Contractor as hereinafter specified will be delivered and turned over to this Contractor. Storing and protection of such

equipment shall be done by this Contractor and the furnishing of all applicable accessories and miscellaneous fittings to make complete shall be provided by this Contractor.

BB. RESTORATION OF PROPERTY:

This Contractor shall carefully restore all property defaced by operations or acts of any of his agents or employees. Such restoration shall include seeding, sodding, and transplanting of lawns, hedges, ornamental planting, and the repair or replacement of driveways, walks, fences, steps, or other facilities in such a manner as to meet with the approval of the Designer and to be at least equal in quality to the original undisturbed work.

CC. RENOVATIONS/ALTERATIONS:

Survey: Before any work is started in existing building, Mechanical Contractor shall make a thorough survey with Designer and a representative of the Owner of building in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by all three to Designer. This report shall list by rooms and spaces:

1. Existing condition and types of resilient flooring, doors, windows, walls and other surfaces not required to be altered throughout and affected areas of building.

2. Existence and condition and operation of items such as thermostats, EMS devices and accessories, HVAC equipment, etc., required by drawings to be either reused or relocated, or both.

3. Shall note any discrepancies between drawings and existing conditions at site.

4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and Designer.

Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of Designer and Owner's representative, to be in such condition that their use is impossible or impractical, shall be removed and a proposal submitted by Contractor to replace with new items in accordance with specifications which will be furnished by Designer.

Re-Survey: Fifteen days before expected partial or final inspection date, Contractor, Designer, Owner's representative, together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, mechanical devices and accessories, HVA/C equipment, etc., as compared with conditions of same as noted in first condition survey report. Telephone system shall be checked out and any damage caused by construction repaired to the satisfaction of this designer and owner.

1. Re-survey report shall also list any damage caused by this Contractor to such flooring and other surfaces, despite protection measures; and, will form basis for determining extent of repair work required of this Contractor to restore damage caused by Contractor's workmen in executing work of this Contract.

DD. PROJECT CLOSEOUT

When this Contractor considers that his work is complete in all respects, per plans and specifications, he shall conduct an inspection of project with office and field supervision personnel and prepare a punchlist of outstanding/incomplete/deficient items of work. This inspection shall include review of all specified documentation, certificates, warranties, and close-out information.

When this Contractor considers the above punchlist to be completed or corrected he shall submit to the Designer, in writing, a request for Final Inspection. The request for Final Inspection shall have as attachments the following items:

-- Punchlist prepared by the Contractor, indicating by check-off all completed items (each item individually checked on the list, not a cover letter stating that all items on attached list are complete);

-- One copy of the Contractor's Maintenance and Operation manuals for review by the Designer;

-- As-built marked prints;

-- Copy of the Certificate of Occupancy issued by the local authority having jurisdiction;

-- Contractor's certificate that he has completed all work, per plans and specifications, that he has installed all items in accordance with manufacturer's installation instructions and all applicable codes, and that all systems/equipment furnished have been tested and are in full working order; (see enclosed Certificate Form);

-- Contractor's certificate that the as-built marked prints he provided are complete and accurate in all respects, and that any deviations from original design plans and/or specifications are clearly and accurately shown thereon, including all change orders;

-- Control subcontractor's certificate that all control components have been calibrated and tested and are in proper working order, and that the system is operating in accordance with the specified control sequence in all modes of operation;

-- Report of factory start-up on chiller, boiler, etc.;

-- Testing and balancing reports as specified.

-- Letters documenting Owner training in operation and maintenance of systems and equipment.

This Contractor is advised to allow adequate time in the project schedule to complete all work, including all specified testing, check-out, inspections, certifications, etc., prior to the contract completion date listed in the Notice to Proceed or other such notification, and before it is necessary for the Owner to occupy the facility.

Once the Final Inspection has been conducted, the Designer will issue to this Contractor a punch list of outstanding/deficient items. The Contractor will pursue corrective action to complete the Final Inspection punch list in an expeditious manner. Once all items on the Final Inspection punch list are complete, the Contractor is to submit to the Designer a copy of the Final Inspection punch list with all items checked off, attaching any outstanding documentation required. Additional visits by the Designer which may be required because above procedure has not been followed or accomplished; or, which are necessary to check off Final Inspection punch list items will be at the expense of the Contractor.

Refer to the General Conditions for the completion requirements. As a minimum, the following items must be fully complete, and proper documentation submitted to the Designer, before the Owner can be allowed to occupy any portion of the facility:

-- All life safety systems must be fully operational and certified, including fire alarm, emergency power, egress lighting, intercommunications, sprinkler, etc.

-- The HVAC system must be fully operational in automatic modes of operation and all control components calibrated and certified by the control system installer.

-- Approval of the local authority having jurisdiction through issuance of a Certificate of Occupancy.

-- Owner trained in operation and maintenance of systems and equipment.

CONTRACTOR'S CERTIFICATE OF COMPLETION

PROJECT: _____

CONTRACTOR:_____

I hereby certify the following:

a. That the work on the above-referenced project has been completed in accordance with the plans and specifications, and that all equipment and materials provided have been installed in accordance with manufacturer's installation instructions and all applicable codes;

b. That all items on specified contractor's inspection punch list (copy attached) are completed; and all items on designer's punchlist(s) are completed;

c. That all tests and inspections and sub-contractor's certificates and reports specified in the contract documents have been properly conducted and documented as specified, and that all equipment and systems are now completed and in proper working order;

d. That the as-built marked prints submitted to the Designer are complete and accurate in all respects, showing all deviations from original design plans and all other items specified;

e. That the following Owner's personnel were trained in operation and maintenance of equipment and systems installed under this contract (list names of Owner's personnel and date(s) training was conducted), as specified:

_____

_____

_____

_____

(Contractor)

_____

(Title)

_____

(Date)

15620 MATERIALS:

Materials and workmanship on all work installed under this contract shall be new and of the best quality and shall conform to the best practice for such work and be installed in accordance with manufacturer's recommendations and instructions, including all hardware and accessories recommended or appropriate. Any work or materials not specifically mentioned in these plans and specifications, but required to make this job a complete and workable system shall be furnished and installed by this Contractor. All materials, fixtures, apparatus and materials and methods of installation shall meet with approval of the Designer.

Certain items of manufactured materials and equipment are cited by manufacturer's or product name and model number. This is to establish a standard of design and quality, and is not intended to be restrictive as to the use of materials and equipment of similar design and equivalent quality by other manufacturers, which may be used subject to the approval of the Designer.

A. Proposed Equivalent Products: Items proposed as equivalent to those cited will be considered by the Designer **up to 10 days prior to receipt of bid,** and shall be subject to the approval of the Designer.

After that date, no equivalent material or substitution will be considered or approved, and all items shall be as specified.

Approvals to consider a proposed brand as being equivalent are for acceptable quality range and are not intended or to be construed as a detailed review of products, features, accessories, mounting hardware, compatibility with other equipment being furnished and space available. Preceding are the Contractors responsibility to insure a complete and coordinated installation of this product and must be submitted for approval and review as specified for submittal data. The approval to bid a proposed equivalent brand as a acceptable equipment design product does not relieve the contractor of this responsibility.

Equivalent Products proposed for approval for equipment specified must be equal in every respect and this Contractor shall base his proposal on the quality of materials and equipment covered in these specifications and shown on the drawings, complete with all accessories, hardware, features and functions to provide the same satisfactory performance on this project as the specified item or system. If required by the Designer, this Contractor shall submit for inspection samples of both the specified and the proposed substitute items for comparison by the Designer and test data from a recognized independent testing laboratory for both pieces of equipment.

Where equivalent products proposed and approved for bidding alter the design or space requirements indicated on the plans, this Contractor shall include all items of cost for the revised design and construction, including the cost of any changes or modifications in structural or architectural details, and/or electric service, and the cost of all allied trades involved resulting from use of equivalent product or equipment. This Contractor is to coordinate and bear all cost where such differences affect other Contractor's work.

B. Material Deliveries:

This Contractor shall provide to the Designer as soon as possible, and not later than seven (7) weeks after job is awarded, copies of factory acknowledgements of orders of all major items of material, i.e. air handlers, compressors, controls, special systems, etc. These acknowledgements should show date of factory entry and delivery dates promised by the supplier and be updated as job progresses or changes occur. Subsequent monthly applications for payment will not be processed for payment until above information is received each month.

C. TESTING AGENCY APPROVAL OR LISTING:

1) All fabricated assemblies of electrically operated equipment furnished under this contract shall have approval and listing of recognized third party agencies accredited by the NCBCC to label electrical and mechanical equipment as of August 1, 1991, or other agency satisfactory to authority having jurisdiction; in every case where such approval and listing has been established for said assemblies or equipment.

2) All manufactured items of electrically operated equipment shall have approval and listing of recognized third party agencies accredited by the NCBCC to label electrical and mechanical equipment as of August 1, 1991, or other agency satisfactory to authority having jurisdiction; in every case where such approval and listing has been established for said items of equipment.

15621 SEISMIC RESTRAINTS:

A. The Mechanical Contractor shall be responsible for providing restraints to resist the earthquake effects on the mechanical system. The requirements for these restraints are found in Chapter 16, of the North Carolina

Building Code.

B. Figures in the above code states that this project located in Henderson County, North Carolina --- with effective earthquake spectral response acceleration at short periods (Ss), earthquake spectral response acceleration at 1-second period (S1).

C. Chapter 16 states that parts or portions of the buildings or structure, non-structural components, and their anchorage to the main structural system shall be designed for seismic forces in accordance with the prescribed methods and formulas:

D. Chapter 16 gives the Seismic Building Category, as well as, the facility Seismic Design Category. *The Professional Engineer who is utilized by the Mechanical Contractor for the Seismic Design (See Below), shall select (and include in design submittals) the appropriate Seismic Building Category and Seismic Design Category based on calculation and usage, for each building and / or for each separate building area / usage (where required). Seismic Design Engineer shall consult with Architect and / or Engineer where function or usage of areas are in question. Refer to Architectural plans for area classifications.*

E. The Mechanical Contractor shall refer to the latest edition of the "Seismic Restraint Manual Guidelines for Mechanical Systems" published by SMACNA for guidelines to determine the correct restraints for sheet metal ducts, piping, and conduit, etc.

F. The anchorage of the equipment and machinery for this project shall an integral part of the design and specification of such equipment and machinery. Manufacturers of all equipment including air handling units, pumps, boilers, tanks, compressors, etc. shall provide anchorage details, isolators, seismic mounts and restraints, etc. necessary to comply with Chapter 16 to the Mechanical Contractor for installation. It shall be the Mechanical

Contractor's responsibility to provide and install the equipment, machinery, systems, and assemblies, etc. for this project which satisfy these requirements.

G. Notes / Tables in Chapter 16 of the North Carolina Building Code lists where seismic restraints are not required. Where seismic restraints are required, the Mechanical Contractor shall provide restraints per details and instructions included in SMACNA's Seismic Restraint Manual.

H. Mechanical Contractor shall include shop drawings of the specific methods of seismic restraint to be used for this project before installation of piping, ductwork, and equipment.

I. The Mechanical Contractor shall retain the services of a Professional Engineer registered in the State of North Carolina to design seismic restraint elements required for this project. The engineer's computations, bearing his professional seal, shall accompany shop drawings which show Code compliance. Computations and shop drawings shall be submitted for review prior to the purchasing of materials, equipment, systems, and assemblies.

J. Internal seismic restraint elements of manufactured equipment shall be certified by a professional engineer retained by the manufacturer. Such certificate applies only to internal elements of the equipment. All equipment anchorage requirements shall be coordinated with the building structure and shall be compatible thereto. All such anchorage shall be reviewed by the project's structural engineer.

K. Review of the seismic design and shop drawings by the Engineer/Architect or his agent shall not relieve the Mechanical Contractor of his responsibility to comply with the seismic or any other requirements of the North Carolina State Building Code.

15622 PIPE AND PIPE FITTINGS:

General - Run all piping parallel or perpendicular to building lines and walls unless otherwise shown. Exposed piping arrangements shall be symmetrical straight runs, evenly spaced and graded.

A. PIPING:

1. Piping For A/C Condensate Water Lines: Pipe: A/C condensate pipe shall be "Cresline" PVC, schedule 40, or approved equal, conforming to ASTM Specification D1785-13, suitable for a minimum working pressure of 150 PSI, with water temperature of 120 degrees F. Pipe shall be furnished with couplings and PVC schedule 40 pressure fittings for cement joints. Adapter fittings with screw connections shall be furnished as required for connections to equipment, valves, unions, etc. Joints to be assembled in accordance with manufacturer's recommendations and instructions. Piping shall be adequately supported with hangers spaced in accordance with manufacturer's instructions and recommendations.

All pipe shall be clearly marked with class, specification designation, and pressure rating.

Where condensate piping passes thru rated assemblies, insulated copper piping will be allowed.

3. Gas Piping: Furnish and install gas piping system for use of natural gas or propane gas (refer to drawings) complete in all respects and in compliance with American Standard ASA B 36-10-1959.

Piping and fittings within the building shall be black steel, Schedule 40. Fittings shall be black malleable iron screw type class 150 fittings. Piping below grade shall be installed in conduit-split terra cotta or PVC-DWV drainage pipe, and vented where required.

Piping and fittings outside the building shall be black steel with an approved corrosion resistant coating material. All underground piping to be welded and pipe coated with corrosion prohibitive compound or tape. All interior piping to be painted yellow.

Installation shall be in conformance with NFPA standard No. 54 and North Carolina State Code. Provide shut-off at each branch take-off and at each equipment connection location.

Gas meter (or tank) location, all piping, and installation to be in accordance with the local gas company standard procedures, rules and regulations.

When the gas supply pressure is higher than that at which the branch supply line or gas utilization equipment is designed to operate or varies beyond design pressure limits, a line gas pressure regulator or gas equipment pressure regulator, as applicable, shall be installed by this Contractor.

Gas appliance pressure regulators requiring access to the atmosphere for successful operation shall be equipped with vent piping leading outdoors. A means shall be employed to prevent water from entering this piping and also to prevent stoppage of it by insects and foreign matter.

All cost and fees for bringing gas service to building to be paid by this Contractor.

B. Testing: All piping installations shall be tested at a hydrostatic pressure of 125 p.s.i. and proven tight, to the satisfaction of the Designer. Threaded joints with leaks which cannot be stopped by tightening shall be dismantled and

remade. No caulking of joints will be allowed. Designer shall be given advance notice of time tests are to be made so a representative may be present to observe.

C. Grading and Venting: All piping shall be installed with drain valves at low points to allow complete drainage of all parts of system. Grade all pipes up approximately one inch in twenty feet in direction of flow. On water systems, install manual valved air vents at all high points in system where air pockets may occur, allowing complete purging of systems of air, and where applicable piping to and valving at accessible location.

D. Joints: Joints in piping 2" and under in size may be threaded or welded at the Contractor's option. All joints in pipes 2-1/2" and larger shall be welded, except that all joints in underground pipes shall be welded regardless of size.

E. Fittings: Fittings for screwed joints shall be close grained grey cast iron or malleable iron good for 125 p.s.i. working pressure, tapped with true full threads.

F. Threaded Joints: Threaded joints shall be made up with a thin mixture of oil and graphite, or Rutland joint compound, applied to the male thread only, taking care not to allow excess graphite to work into pipe and wiping clean the surface of the pipe after joint is completed. All threaded pipe shall be thoroughly reamed after cutting.

Oil and graphite shall also be applied to flange bolts or other fabricated work where future dismantling may be required.

G. Reducing Fittings shall be used where pipe size changes are made. No bushings will be allowed. Eccentric reducers shall be used where steam or water circulating lines are reduced in size. Straight side of reducers to be located at bottom of steam lines and at top of water lines.

H. Flanges and companion flanges in welding lines shall be welding neck type, ASTM A181-55T, Grade 1. All other flanges shall be standard weight screwed type unless otherwise noted, same grade as welding flanges. Bolts for flanges shall be correct sizes and lengths and fitted with hex nuts. Bolts shall extend through flanges with not more than 1/4" of extra thread exposed. Gaskets of appropriate material for service shall be installed between flanges.

I. Valves shall be same size as pipe line in which they occur unless otherwise noted.

J. Unions shall be used where necessary to disconnect pipe for future servicing or repairs and at all connections to equipment. Unions in screwed ferrous pipe shall be malleable iron with bronze seats and ground ;joints. Dielectric unions shall be used for all connections of dissimilar metals. Unions in welded pipes shall be flanged as specified elsewhere.

K. Gaskets: Gaskets for flanged connections in water lines shall be machine cut, ring type, cut from 1/8" thick red cloth imbedded rubber or neoprene good for 125 p.s.i. service of correct size for flanges.

M.. Welding to be by the Metal Arc Welding Process and in general conformance with procedures established in the latest edition of Appendix B to Section 6 of the ASA Code for Pressure Piping B 31.1

Operators who are to do the welding must be properly qualified to do satisfactory work. Proof of an operator's qualifications shall be either this Contractor's record of suitable tests passed within the preceding three months while in the employment of this Contractor, or tests made before the start of the work. Any workman considered by the Architect/Engineer as not having the skill necessary for the work shall be required to pass an appropriate qualification tests or shall be at once barred from further welding on the job.

Joints shall be properly beveled, thoroughly cleaned of rust or other foreign matter, before welding. Joints shall be separated sufficiently for easy fusion of the weld metal with the bottom of the vee, and shall be tackwelded in two or more places to maintain proper alignment.

All welding shall be continuous around the joint. Weld metal shall be deposited in such a manner that the sides and bottom of the surface or edges joined are thoroughly fused, with surface of the weld having proper reinforcement and width.

During erection care shall be taken to remove all dirt, scale and other foreign matter from inside the piping before tying in long sections o installing valves.

All welded piping shall be subjected to a hydrostatic test of 1-1/2 times the working pressure, or at least 125 psig., at which pressure all welded joints shall be hammered with a 3# hammer, blows being struck with sufficient force to jar the pipe and the joint, but not so hard as to injure the pipe. All welds shall satisfactorily pass this test without showing leaks or any defects. Designer shall be given advance notice of times tests are to be made, so a representative may be present to observe.

Pinhole leaks which may develop as a result of the test shall be repaired by welding. Welds which show general sweating or continuity of pinholes shall be replaced.

Welding fittings shall be used with welded piping. These shall be welding pattern, Tube Turns, Taylor Forge, Landish, or equal. Such fittings shall be provided at all changes in direction, or changes in pipe size except as hereinafter provided.

Weldolet or Threadolet fittings may be used in lieu of welded fittings for branch connection to size 2" and larger mains, provided branch is two or more pipe sizes smaller than the main.

15624 PIPING SPECIALTIES:

A. Hangers and Supports:

All piping shall be supported from the building structure. Refer to structural drawings, details and/or the designer as applicable.

Pipe hanger shall be supported by means of iron hanger rods from the building construction. Where shown on the plans, or where required, piping shall be hung from angle iron clips or suitable brackets attached to sides of masonry construction similar to Grinnell Fig. 195. Where piping is hung from bar joists, angle iron supports shall be welded to joists (at least three) and hanger rod attached to supporting angle, as directed by the Designer. Angle iron provided by Mechanical Contractor.

Hanger rods shall have machine threads and be sized according to manufacturer's recommendations.

Support spacing shall be a minimum of:

Pipes 1" and smaller - 8'-0" centers maximum

Pipes 1 1/4" and larger - 10'-0" centers maximum

Support pipes at all changes in direction

All suspended piping shall be supported by means of wrought iron hanger rings or adjustable clevis hangers and iron hanger rods. Hangers shall be sized for the outside diameter of the insulation for piping that is insulated.

Piping shall be hung by means of clevis type hangers similar to Grinnell Fig. 260. In spaces where indicated or where required due to limited space, Grinnell #171 shall be used. Alternately, a rack type piping support system may be used similar to Unistrut pipe clamps complete with appropriate insulating and mounting hardware.

Hangers for uninsulated copper piping shall be Grinnell Fig. 97-CT.

All miscellaneous metal required for supporting pipe work, including steel supports, angles between joists, anchors, inserts, bracing, bolts, nuts, washers, etc shall be supplied and installed by this Contractor. All miscellaneous metal shall be painted.

Hanging arrangements shall be subject to approval of Designer.

All insulated piping shall be provided with insulation protection sheet metal saddles. These shall be No. 16 gauge galvanized iron. Saddles shall be of length equal to two times the outside diameter of the insulation and shall extend to above center lines of the pipe.

B. Pipe Sleeves:

Where pipes pass through floors or walls, provide standard weight, Schedule 40, steel pipe sleeves, finishing flush with wall surfaces and extending 1/2" above finish floors. Sleeves for insulated pipes shall be of sufficient size to allow passage of insulation. All sleeve openings to be appropriately sealed at completion of construction, with a U.L. listed fire barrier; Dow Corning 3-6548 silicon RTV foam, "3M" CP25 caulk or 303 putty, T & B "Flame Safe", or approved equal. Sleeves through floors shall have concrete curb poured surrounding sleeve.

C. Floor and Ceiling Plates:

Where pipes or hanger rods pass through floors, walls or ceilings in finished areas, provide chrome-plated spring type steel escutcheon of approved design for neat application and of adequate size to cover sleeve openings as manufactured by Kenney, Connecticut Stamping and Bending Company, Dearborne or approved equal.

15629 PIPE INSULATION:

All piping shall be insulated, including all accessories, fittings, valves, and etc.

A/C condensate PVC piping does not require insulation. A/C copper piping shall have ¾" Armaflex (flexible elastomeric) insulation – installed per manufacturer's installation instructions. Outdoor insulation shall be protected with pvc, u.v. resistant jacketing – color to match building.

15630 ELECTRIC MOTORS:

Motors shall be high efficiency type of sufficient size for the duty to be performed and shall not exceed their full rated load when the driven equipment is operated at specified capacity under the most severe conditions likely to be encountered. Motors shall have continuous duty classification based on 40 C ambient temperature or reference. Minimum motor efficiencies shall be in accordance with N.C. Mechanical Code, and ASHRAE 90.

Motors 1/3 HP or smaller shall be wired to single phase, 120 volt power; motors 1/2 HP or larger shall be wired for 3-phase power. All 3-phase motors to be rated in accordance with latest NEMA standards. Shaded pole motors larger than 1/20 HP will not be permitted. Motors 2 HP or larger shall have grease lubricated ball bearings.

Provide starters with H-O-A switches mounted in door and proper overload elements for all motors furnished and installed under this contract, including single phasing protection. Switches and controls shall be located for convenient access and use if not specifically located on drawings.

15732 PACKAGED ROOF OR GROUND-MOUNTED AIR-TEMPERING UNIT:

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Package roof top unit.

B. Heat exchanger.

C. Refrigeration components.

D. Unit operating controls.

E. Roof curb.

F. Electrical power connections.

G. Operation and maintenance service.

1.02 RELATED SECTIONS

A. Section 15170 - Motors.

B. Section 15242 - Vibration Isolation.

C. Section 15290 - Ductwork Insulation.

D. Section 15885 - Air Cleaning.

E. Section 15952 - Controls and Instrumentation.

F. Section 16180 - Equipment Wiring Systems.

1.03 REFERENCES

A. NFPA 90 A & B - Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.

B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

C. AHRI 360 - Commercial and Industrial Unitary Air Conditioning Equipment testing and rating standard.

D. ANSI/ASHRAE 37 - Testing Unitary Air Conditioning and Heat Pump Equipment.

E. ANSI/ASHRAE/IESNA 90.1-1999 - Energy Standard for New Buildings Except Low-Rise Residential Buildings.

F. ANSI Z21.47/UL1995 - Unitary Air Conditioning Standard for safety requirements.

G. AHRI 210/240 - Unitary Air-Conditioning Equipment and Air- Source Heat Pump Equipment.

H. AHRI 270 - Sound Rating of Outdoor Unitary Equipment.

I. AHRI 370 - Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.

J. ANSI/NFPA 70-1995 - National Electric Code.

1.04 SUBMITTALS

A. Submit unit performance data including: capacity, nominal and operating performance.

B. Submit Mechanical Specifications for unit and accessories describing construction, components and options.

C. Submit shop drawings indicating overall dimensions as well as installation, operation and services clearances. Indicate lift points and recommendations and center of gravity. Indicate unit shipping, installation and operating weights including dimensions.

D. Submit data on electrical requirements and connection points. Include recommended wire and fuse sizes or MCA, sequence of operation, safety and start-up instructions.

E. Shop drawings submitted for approval shall be accompanied by a copy of the purchase agreement between the Contractor and an authorized service representative of the manufacturer for check, test and start up and first year service.

1.05 DELIVERY, STORAGE and HANDLING

A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

B. Protect units from physical damage. Leave factory shipping covers in place until installation.

1.06 WARRANTY

A. Provide parts warranty for one year from start-up or 18 months from shipment, whichever occurs first.

B. Provide five year extended warranty for compressors.

C. Provide five-year heat exchanger limited warranty.

1.07 REGULATORY REQUIREMENTS

A. Unit shall conform to ANSI Z21.47/UL1995 for construction of packaged air conditioner<<ANSI_Z21.47/UL_1995_REQUIREMENTS3>>

1. In the event the unit is not UL approved, the manufacturer must, at his expense, provide for a field inspection by a UL representative to verify conformance to UL standards. If necessary, contractor shall perform modifications to the unit to comply with UL, as directed by the UL representative, at no additional expense to the Owner.

PART 2 PRODUCTS

2.01 SUMMARY

A. The contractor shall furnish and install package rooftop unit(s) as shown and scheduled on the contract documents. The unit(s) shall be installed in accordance with this specification and perform at the specified conditions as scheduled.

B. APPROVED MANUFACTURERS

1. Trane is the basis of design. Approved equivalent products by Carrier, Johnson, and Daikin. **Alternate #M1 – Owner preferred brand of equipment to be by Trane (only) – for standardization.**

2. Substitutions: [10 working days prior approval required] as indicated under the general and/or supplemental conditions of these specifications. Mechanical contractor shall be responsible for

electrical and mechanical changes to the structure when using a product other than the specified product. As built drawing changes are the responsibility of the mechanical contractor. [In California, the contractor is responsible for resubmittal under Title 20 of California Law.]

2.02 GENERAL UNIT DESCRIPTION

A. Unit(s) shall be 100% factory run tested and fully charged with R-410A

B. Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.

C. Units shall be dedicated downflow or dedicated horizontal airflow as manufactured.

D. Wiring internal to the unit shall be colored and numbered for identification.

2.03 UNIT CASING

A. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 16 gauge with access doors and removable panels of minimum 20 gauge.

B. Units cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.

C. Cabinet construction shall allow for all service/ maintenance from one side of the unit.

D. Cabinet top cover shall be one piece construction or where seams exits, it shall be double-hemmed and gasket-sealed.

E. Access Panels: Water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.

F. Downflow unit's base pans shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.

G. Insulation: Provide 1/2 inch thick coated fiberglass insulation on all exterior panels in contact with the return and conditioned air stream.

H. Provide openings either on side of unit or thru the base for power, control and gas connections.

I. The base of the unit shall have provisions for forklift and crane lifting

2.04 AIR FILTERS

A. 2" Pleated Filters - Unit shall be provided with two inch MERV 13 filters with filter removal tool as standard on all products.

2.05 FANS AND MOTORS

A. Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.

B. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.

C. Provide units 12 1/2 tons and above with belt driven, supply fans with adjustable motor sheaves.

D. Outdoor and Indoor Fan shall be permanently lubricated and have internal thermal overload protection.

E. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.

F. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

2.06 GAS FIRED HEATING SECTION

A. Completely assembled and factory installed heating system shall be integral to unit, UL or CSA approved specifically for outdoor applications for use downstream from refrigerant cooling coils. Threaded connection with plug or cap provided.

B. Heating section shall be factory run tested prior to shipment.

C. Gas Burner shall be forced combustion type power burner, negative pressure gas valve, manual shut-off, hot surface ignition, and flame sensing safety control.

D. Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Upon a failure to ignite, two attempts of ignition will occur before lockout of the ignition system.

E. Combustion blower shall be centrifugal type fan with built- in thermal overload protection on fan motor.

F. Heat Exchanger: Provide drum and tube heat exchanger of free floating design manufactured from 18-gauge aluminized steel, factory pressure and leak tested.

G. Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.

2.07 EVAPORATOR COIL

A. Provide configured aluminum fin surface mechanically bonded to copper tubing coil.

B. Provide an independent expansion device for each refrigeration circuit. Factory pressure test at 450 psig and leak test at 200 psig.

C. Provide drain pan for base of evaporator coil constructed of PVC or galvanized steel with external connections.

2.08 CONDENSER SECTION

A. Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced. Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.

2.09 REFRIGERATION SYSTEM

A. Compressor(s): Provide scroll compressor with direct drive operating at 3600 rpm. Integral centrifugal oil pump. Provide suction gas cooled motor with winding temperature limits and compressor overloads.

B. Units shall have cooling capabilities down to 0-degree F as standard. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.

C. Provide each unit with 2 refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

2.10 OUTDOOR AIR SECTION

A. Provide economizer with dry bulb control

B. Provide adjustable minimum position control located in the economizer section of the unit.

C. Provide spring return motor for outside air damper closure during unit shutdown or power interruption.

D. Provide CO2 sensor for control of outside air.

2.11 OPERATING CONTROLS

A. Provide factory-wired roof top units with 24 volt control circuit with control transformers, contactor pressure lugs or terminal block for power wiring. Contractor to provide Disconnect. Units shall have single point power connections. Field wiring of zone controls to be NEC Class II.

B. Provide microprocessor unit-mounted control which when used with an electronic zone sensor provides proportional integral room control. This UCM shall perform all unit functions by making all heating, cooling and ventilating decisions through resident software logic.

C. Provide factory-installed indoor evaporator defrost control to prevent compressor slugging by

interrupting compressor operation.

D. Provide an anti-cycle timing and minimum on/off between stages timing in the microprocessor.

E. Economizer Preferred Cooling (if supplied with economizer) - Compressor operation is integrated with economizer cycle to allow mechanical cooling when economizer is not adequate to satisfy zone requirements. Compressors are enabled if space temperature is recovering to cooling setpoint at a rate of less than 0.2 degrees per minute. Compressor low ambient lockout overrides this function.

2.12 BUILDING MANAGEMENT SYSTEM

A. Interface control module to (future) Energy Management System to be furnished and mounted by rooftop unit manufacturer. Through this interface module, all Energy Management functions (specified in Energy Management Section) shall be performed. The interface is to be connected to BAS for this project. All points shall be integrated to BAS to provide full monitoring, setpoint adjustment (temp., economizer, etc.), operating schedule adjustment (on/off), etc. Fully functionality shall be possible via BAS or via local control. Provide all BAS interface modules, parts, etc. as required for a complete installation. Interface shall be Bacnet compatible. Tie-In to the BAS shall be future

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall verify that roof is ready to receive work and opening dimensions are adequate.

B. Contractor shall verify that proper power supply is available.

3.02 INSTALLATION

A. Contractor shall install in accordance with manufacturer's instructions.

B. Mount units on factory built roof mounting frame providing watertight enclosure to protect ductwork

and utility services. Install roof mounting curb level.

PART 4 SEQUENCE OF OPERATIONS

4.01 PACKAGED ROOFTOP UNITS (RTU)

A. Microprocessor controller - Each RTU shall be controlled by a stand-alone microprocessor based controller with resident control logic. The controller will interface with the BAS and the inputs and outputs in the points list to accomplish the following temperature control and energy conservation strategies.

1. Occupied Mode - All unit functions will be enabled for normal heating and cooling operation. Unit defaults to default temperature setpoints in the unit microprocessor when communication with BAS is lost.

2. Occupied Space Temperature Control - When in occupied mode as described above, the dedicated unit control shall operate stages of heating and cooling to maintian space temperature setpoint. Setpoints may be set by one of the following methods:

   a. Remotely through BAS by the system operator;

   b. Locally through the thermostat by the occupant;

   c. Locally through the thermostat by the occupant within limits defined through the BAS by the system operator;

   d. Operator may designate wild card setpoints to apply to any or all of the RTU's through the BAS.

B. Optimal Start Mode - When the unit is turned on by the BAS for optimal start, heating or cooling is provided as required. The outside air dampers, if provided, remains closed, in heating mode or mechanical cooling mode, until occupied time. Economizer cycle, if supplied, will be available if

required.

C. Coastdown Mode - When the unit is turned "OFF" by the BAS for optimal stop, the supply fan remains "ON/AUTO", the outside air damper remains in minimum position for ventilation, and utilizes the unoccupied setpoints.

D. Demand Limit Mode - Through the BAS a user defined Demand Limit Mode shall be available. User defines maximum off time and temperature to ensure occupant comfort.

E. Night Setback Temperature Control - When the BAS selects unoccupied mode, the unit shall be controlled to maintain user defined unoccupied heating and cooling setpoints. Adjustable start and stop temperature differentials will prevent short cycling. The outdoor air damper remains closed during heating night setback operation, if provided.

F. Economizer - Each RTU when equipped will measure dry bulb temp and select lowest total heat air stream to meet cooling demands. When using return air, the outside air damper will be position at a minimum position. The minimum position will be adjustable by the operator or through the BAS software.

G. Nighttime Free-Cool Purge Mode - An "economizer only" cooling cycle shall be provided during unoccupied hours when outdoor air conditions are suitable and the zone requires cooling.

H. Low Ambient Compressor Lockout - Compressor operation shall be disabled below a user defined outdoor air temperature.

I. Timed Override - When a timed override is initiated by the user, the unit will return to its user defined normal occupied mode for the user determined period of time.

J. Fire Shutdown - The unit will shut down in response to a customer supplied contact closure to the BAS indicating the presence of a fire or other emergency condition.

K. Unit status report - For each RTU unit, the BAS shall provide an operating status summary of all sensed values (zone temperature, discharge temperature, etc.) setpoints and modes.

L. Supply Air Tempering - When the unit is in the heat mode, but not actively heating, if the supply air temperature drops 10 degrees or more below the heating setpoint, heat is turned on until supply air temperature rises to a point 10 degrees above the heating setpoint.

M. Alternating Lead/Lag - (Dual Compressors Models Only), During periods of part load operation, each compressor cycles alternatively as circuit circuit number one in order to equalize wear and run time.

N. Economizer Preferred Cooling - Compressor operation is integrated with economizer cycle to allow mechanical cooling when economizer is not adequate to satisfy zone requirements. Compressors are enabled if space temperature is recovering to cooling setpoint at a rate of less than 0.2 degrees pe rminute. Compressor low ambient lockout overrides this function.

O. Diagnostic/Protection - The BAS system shall be able to alarm from all sensed points from the rooftop units and diagnostic alarms sensed by the unit controller. Alarm limits shall be designated for all sensed points.

15764 DUCT WORK:

GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rectangular ducts and fittings.

2. Round ducts and fittings.

3. Sheet metal materials.

4. Sealants and gaskets.

5. Hangers and supports.

6. Seismic-restraint devices.

B. Related Sections:

1. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

2.2 PERFORMANCE REQUIREMENTS

A. Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under specified operating conditions.

B. Use material, weight, thickness, gauge, construction and installation methods as outlined in the following SMACNA publications, unless noted otherwise:

1. HVAC Duct Construction Standards, Metal and Flexible, 2nd Edition, 1995

2. HVAC Air Duct Leakage Test Manual, 1st Edition, 1985

3. HVAC Systems - Duct Design, 3rd Edition, 1990

4. Rectangular Industrial Duct Construction Standard, 1st Edition, 1980

5. Round Industrial Duct Construction Standards, 2nd Edition, 1999

6. Thermoplastic Duct (PVC) Construction Manual, 2nd Edition, 1995

7. Round Industrial Duct Construction Standards, 2nd Edition, 1999

8. Rectangular Industrial Duct Construction Standards, 1st Edition, 1980

C. Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

3.2 SUBMITTALS

A. Include manufacturer's data and/or Contractor data for the following:

1. Schedule of duct systems including material of construction, gauge, pressure class, system class, method of reinforcement, joint construction, fitting construction, and support methods, all with details as appropriate.

2. Duct sealant and gasket material.

3. Duct liner including data on thermal conductivity, air friction correction factor, and limitation on temperature and velocity.

A. Welding certificates.

7.2 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.

2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.

3. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

PRODUCTS

9.2 GENERAL

A. All sheet metal used for construction of duct shall be 24 gauge or heavier except for round and spiral ductwork and spiral duct take-offs 12” and below may be 26 gauge where allowed in SMACNA HVAC Duct Construction Standards, Metal and Flexible, 2nd Edition, 1995.

B. Duct sizes indicated on plans are net inside dimensions; where duct liner is specified, dimensions are net, inside of liner.

9.3 DUCTWORK PRESSURE CLASS

A. Minimum acceptable duct pressure class, for all ductwork except transfer ductwork, is 2 inch W.G. positive or negative, depending on the application. Transfer ductwork minimum acceptable duct pressure class is 1 inch W.G. positive or negative, depending on the application. Duct system pressure classes not indicated on the drawings to be as follows:

Supply duct upstream of VAV boxes	_____ 3”-4” S.P.	___4” pressure class
Supply duct downstream of VAV terminals	1”-2” S.P.	___2” pressure class
Transfer ducts	_____ ½”-1” S.P.	_____ 1” pressure class
Exhaust ducts	_____ 1”-2” S.P.	_____ 2” pressure class
Return ducts	_____ 1”–2” S.P.	_____ 2” pressure class
Relief ducts	_____ 1”-2” S.P.	_____ 2” pressure class
Constant Volume AHU Supply	_____ 2”-3” S.P.	_____ 3” pressure class
Grease Hood Exhaust	_____ 2”-3” S.P.	_____ 3” pressure class
**Smoke Exhaust System	_____ 3”-4” S.P.	_____ 4” pressure class

**Note: All ductwork that serves a dual function (i.e. return / relief and smoke exhaust (for example)) shall be constructed to the highest pressure requirement. All ductwork that is part of the smoke exhaust system shall be constructed to the listed classification for smoke exhaust ductwork. Care should be taken in this determination to avoid field replacement of duct sections.

9.4 MATERIALS

A. Galvanized Steel Sheet: Use ASTM A 653 galvanized steel sheet of lock forming quality. Galvanized coating to be 1.25 ounces per square foot, both sides of sheet, G90 in accordance with ASTM A90.

B. Uncoated Black Steel Sheet: First quality, soft steel sheet capable of welding or double seaming without fracture.

C. Aluminum Sheet: Use ANSI/ASTM B209 aluminum sheet, alloy 3003H-14, capable of double seaming without fracture.

D. Stainless Steel Sheet: Use ASTM A167, Type 304 or 316 stainless steel sheet as specified, 316L if welded ductwork, with No. 2B finish for concealed work and No. 3 finish for exposed work.

E. Polyvinylchloride Coated Steel Sheet: Use hot-dipped galvanized steel sheet with prime coat and a polyvinyl chloride film on both sides. Thickness of coating to be a minimum of 4 mils on each side. United Sheet Metal Uni-Coat, made by United McGill Co., may be used at contractor's option.

1. Where any duct surface is scratched, marred, or otherwise damaged, paint with PVC aerosol spray.

2. All couplings shall be slip-joint construction with a minimum 2 inches insertion length. Seal all couplings with sealants as specified.

9.5 HIGH PRESSURE DUCTWORK (Pressure class 3 inch and over)

A. Manufacturers: Ajax, Semco, United Sheet Metal, or approved equal.

B. Machine formed round and/or flat oval spiral lock seam duct constructed of galvanized steel.

~~C.~~ Rectangular high pressure duct using a transverse joint system as manufactured by Ductmate, Nexus, TDC, TDF, or approved equal, may be used at contractor's option. Duct to be flanged, gasketed and sealed.

D. Contractor fabricated ductwork meeting specified construction standards is acceptable with prior approval of Architect/Engineer. Submit construction details, a description of materials to be used, type of service, reinforcing methods, and sealing procedures.

E. Use a perforated inner liner on double wall high-pressure duct. Annular space between inner liner and outer duct to be filled with 1 inch glass fiber insulation.

F. Use cemented slip joints with 2 inch minimum overlap, flanged connections, or welded/brazed connections, unless noted otherwise for special applications. Prime coat welded joints.

G. Provide standard 90 degree conical tee takeoffs except for exhaust at velocities over 2000 feet per minute, use 45° lateral connections; straight taps or bullhead tees are not acceptable.

H. Internal bracing will not be accepted on ductwork below 48 inches.

I. Use turning vanes as specified in Section 23 33 12.

J. Provide bellmouth fittings or expanded fittings at each duct connection to air plenums.

K. Provide pressure relief fittings as indicated on the plans and/or details.

L. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.

9.6 LOW PRESSURE DUCTWORK (Maximum 2 inch pressure class)

A. Fabricate and install ductwork in sizes indicated on the drawings and in accordance with SMACNA recommendations, except as modified below.

B. Construct so that all interior surfaces are smooth. Use slip and drive or flanged and bolted construction when fabricating rectangular ductwork. Use spiral lock seam construction when fabricating round spiral ductwork. Sheet metal screws may be used on duct hangers, transverse joints and other SMACNA approved locations if the screw does not extend more than 1/2 inch into the duct.

C. Use elbows and tees with a center line radius to width or diameter ratio of 1.5 wherever space permits. When a shorter radius must be used due to limited space, install single wall sheet metal splitter vanes in accordance with SMACNA publications, Type RE 3. Where space will not allow and the C value of the radius elbow, as given in SMACNA publications, exceeds 0.31, use rectangular elbows with turning vanes as specified in Section 23 33 00. Square throat-radius heel elbows will not be acceptable. Straight taps or bullhead tees are not acceptable.

D. Where rectangular elbows are used, provide turning vanes in accordance with Section 23 33 00.

E. Provide expanded take-offs or 45 degree entry fittings for branch duct connections with branch ductwork airflow velocities greater than 700 fpm. Square edge 90-degree take-off fittings or straight taps will not be accepted.

F. Button punch snaplock construction will not be accepted on aluminum ductwork.

G. Round ducts may be substituted for rectangular ducts if sized in accordance with ASHRAE table of equivalent rectangular and round ducts, with approval of Engineer. No variation of duct configuration or sizes permitted except by written permission of the Architect/Engineer.

H. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

9.7 DUCT SEALANT

A. Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal & Seal, Lockformer cold sealant, Mon-Eco Industries, United Sheet Metal, or approved equal. Silicone sealants are not allowed in any type of ductwork installation.

B. Install sealants in strict accordance with manufacturer's recommendations, paying special attention to temperature limitations. Allow sealant to fully cure before pressure testing of ductwork, or before startup of air handling systems.

9.8 GASKETS

A. 2 inch pressure class and lower: Soft neoprene or butyl gaskets in combination with duct sealant for flanged joints.

B. 3 inch pressure class and higher: Butyl gaskets.

C. FUME HOOD EXHAUST; Butyl gaskets.

EXECUTION

9.9 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved by Designer prior to fabrication.

B. Take field measurements to verify duct routing and coordination with all trades prior to fabrication.

C. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

D. Install round ducts in maximum practical lengths.

E. Install ducts with fewest possible joints.

F. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

G. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

H. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

I. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

J. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

K. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

L. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.

M. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines." All ductwork open ends to be capped during the course of construction.

N. Owner and / or owner's representative shall be notified a minimum of 24 hours in advance of any duct pressure testing. Results of duct pressure testing shall be forwarded to the owner / engineer

for approval and included in the final test and balance report. All ductwork shall be pressure tested per recommendations in SMACNA.

10.2 SEAM AND JOINT SEALING

A. Seal duct seams and joints for duct static-pressure and leakage classes specified in "Performance Requirements" Article, according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 1-2, "Standard Duct Sealing Requirements," unless otherwise indicated.

B. Seal Classes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 1-2, "Standard Duct Sealing Requirements."

11.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.

2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.

3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.

4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

1. Do not use powder-actuated concrete fasteners for seismic restraints.

B. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

E. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

13.2 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" and requirements of Delegated Design in Division 23 Section "Vibration and Seismic Controls for HVAC."

14.1 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

15.2 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as follows:

1. Moist Environment Ducts: Aluminum.

Commercial Kitchen Hood Exhaust Ducts: Comply with NFPA 96.

Exposed to View: Type 304, stainless-steel sheet, **No. 4 finish**.

Concealed: **Type 304, stainless-steel sheet, No. 2D finish**.

Welded seams and joints.

Dishwasher Hood Exhaust Ducts:

Type 304, stainless-steel sheet.

Exposed to View: **No. 4 finish**.

Concealed: **No. 2D finish**.

Welded seams and flanged joints with watertight EPDM gaskets.

B. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

2. Stainless-Steel Ducts: Galvanized steel.

3. Aluminum Ducts: Aluminum or galvanized sheet steel coated with zinc chromate.

C. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Elbows."

a. Velocity 1000 fpm or Lower:

1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.

2) Mitered Type RE 4 without vanes.

b. Velocity 1000 to 1500 fpm:

1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.

2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.

3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."

c. Velocity 1500 fpm or Higher:

1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.

2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.

3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-3, "Vanes and Vane Runners," and Figure 2-4, "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."

a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.

2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.

3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.

c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or Welded.

D. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-6, "Branch Connections."

a. Rectangular Main to Rectangular Branch: 45-degree entry.

b. Rectangular Main to Round Branch: Spin in.

2. Round: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "90 Degree Tees and Laterals," and Figure 3-5, "Conical Tees." Saddle taps are permitted in existing duct.

a. Velocity 1000 fpm or Lower: 90-degree tap.

b. Velocity 1000 to 1500 fpm: Conical tap.

c. Velocity 1500 fpm or Higher: 45-degree lateral.

15765 AIR DUCT ACCESSORIES:

SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.

2. Manual volume dampers.

3. Control dampers.

4. Fire dampers.

5. Smoke dampers.

6. Flange connectors.

7. Turning vanes.

8. Duct-mounted access doors.

9. Flexible connectors.

10. Flexible ducts.

11. Duct accessory hardware.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.

b. Manual volume damper installations.

c. Control damper installations.

d. Fire-damper and smoke-damper installations, including sleeves; and duct-mounted access doors.

e. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with AMCA 500-D testing for damper rating.

PART 2 - PRODUCTS

2.1 MANUAL VOLUME DAMPERS

A. Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.

B. Dampers must be constructed in accordance with SMACNA Fig. 2-12, Fig. 2-13, and notes relating to these figures, except as modified below.

C. Reinforce all blades to prevent vibration, flutter, or other noise. Construct dampers in multiple sections with mullions where width is over 48 inches. Use rivets or tack welds to secure individual components; sheet metal screws will not be accepted. Provide operators with locking devices and damper position indicators for each damper; use an elevated platform on insulated ducts. Provide end bearings or bushings for all volume damper rods penetrating ductwork constructed to a 3" w.c. pressure class or above.

2.2 TURNING VANES

A. Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

B. Construct turning vanes and runners for square elbows in accordance with SMACNA Fig. 2-3 and Fig. 2-4 except use only airfoil type vanes. Construct turning vanes for short radius elbows and elbows where one dimension changes in the turn in accordance with SMACNA Fig. 2-5 and Fig. 2-6.

2.3 FIRE DAMPERS

A. Manufacturers: Air Balance, Advanced Air, American Warming and Ventilating, Greenheck, Phillips-Aire, Prefco, Ruskin, Safe-Air or approved equal.

B. STATIC FIRE DAMPERS

1. Static fire damper assemblies must be UL 555 (6th edition) listed and labeled for static applications (where air systems do not operate during a fire) and meet requirements of NFPA 90A. Damper must be type B curtain type with blades out of the air stream; dampers with blades in the air stream will not be accepted. Damper fire rating to be compatible with the rating of the building assembly in which the damper is used.

C. DYNAMIC FIRE DAMPERS

1. Dynamic fire damper assemblies must be UL 555 (6th edition) listed and labeled for dynamic applications (where air systems operate during a fire) and meet requirements of NFPA 90A. Dampers must be type B curtain type with curtain 100% out of air stream. Dampers larger than 30” by 30” or with velocity rating requirements of 3000 fpm or higher, may be multiblade type with blades located in the airstream. Velocity ratings and static pressure ratings as indicated on the drawings. Damper fire rating to be compatible with the rating of the building assembly in which the damper is used.

2.4 SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS

A. Manufacturers: Ruskin, Johnson Controls, Air Balance, Advanced Air, American Warming and Ventilating, Greenheck, Safe-Air, Phillips-Aire, Prefco, or approved equal.

B. Smoke damper assemblies to be UL 555S(4th edition) listed and labeled, and leakage rated at no higher than Class II under UL 555S(4th edition). Unless ratings are indicated elsewhere, dampers should be rated for minimum 2,000 fpm air velocity and 4" static pressure.

C. Combination fire/smoke damper assemblies to be UL 555(6th edition) and UL 555S(4th edition) listed and labeled, and have a fire rating compatible with the rating of the building assembly in which the damper is used, and be leakage rated at no higher than Class II under UL 555S.

D. Provide factory installed electrically operated dampers with linkage arranged so that the damper is closed on loss of power. For electric actuation, provide electric operated dampers with linkage and UL listed operators arranged so that the damper is closed on a loss of power. Where electric actuation is controlled by the DDC system use 0-10 VDC inputs, with stall protection, and with and zero and span adjustments for modulating or 24 VAC for two-position control. All electric actuators will be provided with overload protection to prevent motor from damage when stall condition is encountered. Locate all operators out of the air stream unless large damper size will not allow. Provide form "C" end switches to indicate damper position.

E. Use airfoil shaped damper blades on the following systems where the duct velocity is above 2000 fpm (coordinate with metal duct specifications, duct drawings / submittals, etc.).

2.5 ACCESS DOORS

A. Access door to be designed and constructed for the pressure class of the duct in which the door is to be installed. Doors in exposed areas shall be hinged type with cam sash lock. Hinges shall be steel full length continuous piano type. Doors in concealed spaces may be secured in place with cam sash latches. For both hinged and non hinged doors provide sufficient number of camp sash latches to provide air tight seal when door is closed. Do not use hinged doors in concealed spaces if this will restrict access. Use minimum 1" deep 24 gauge galvanized steel double wall access doors with minimum 24 gauge galvanized steel frames. For non-galvanized ductwork, use minimum 1" deep double wall

access door with frame that shall use materials of construction identical to adjacent ductwork. Provide double neoprene gasket that shall provide seals from the frame to the door and frame to the duct. When access doors are installed in insulated ductwork or equipment provide insulated doors with insulation equivalent to what is provided for adjacent ductwork or equipment. Access doors constructed with sheet metal screw fasteners will not be accepted. Access doors to have minimum size of 12”x6”. All fire dampers, smoke dampers, and combination fire / smoke dampers shall be capable of being operated / reset / observed via duct access door(s) or have other means available to do so.

B. Use insulated, 1-1/2 hour UL 555 listed and labeled access doors in kitchen exhaust ducts.

2.6 FLEXIBLE DUCT

A. Manufacturers: Anco Products, Clevaflex, Thermaflex, Flexmaster or approved equal.

B. Factory fabricated , UL 181 listed as a class 1 duct, and having a flame spread of 25 or less and a smoke developed rating of 50 or under in accordance with NFPA 90A.

C. Suitable for pressures and temperatures involved but not less than a 180°F service temperature and ±2 inch pressure class, depending on the application.

D. Duct to be composed of polyester film, aluminum laminate or woven and coated fiberglass fabric bonded permanently to corrosion resistant coated steel wire helix. Two-ply, laminated, and corrugated aluminum construction may also be used.

E. Where duct is specified to be insulated, provide a minimum 1 inch fiberglass insulation blanket with maximum thermal conductance of 0.23 K (75 degrees F.) and vapor barrier jacket of polyethylene or metalized reinforced film laminate. Maximum perm rating of vapor barrier jacket to be 0.1 perm.

2.7 DUCT LINING (No Duct Liner Allowed – This Project)

2.8 DUCT FLEXIBLE CONNECTIONS

A. Material to be fire retardant, be UL 214 listed, and meet the requirements of NFPA 90A.

B. Connections to be a minimum of 3 inches wide, crimped into metal edging strip, and air tight. Connections to have adequate flexibility and width to allow for thermal expansion/contraction, vibration of connected equipment, and other movement.

C. Use coated glass fiber fabric for all applications. Material for inside applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with neoprene, air and water tight, suitable for temperatures between -10°F and 200°F, and have a nominal weight of 30 ounces per square yard. Material used for outdoor applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with Hypalon¿,air and water tight, suitable for temperatures between -10°F and 250°F, and have a nominal wight of 26 ounces per square yard.

D. For corrosive environments or fume exhaust applications indoors or outdoors, use a material coated with Teflon that is air and water tight, suitable for temperatures between -20°F and 500°F, and has a nominal weight of 14 ounces per square yard.

2.9 SOUND ATTENUATORS

A. Manufacturers: Industrial Acoustics Company, Environmental Elements Corporation, Semco, Dynasonics, United McGill, Rink, or approved equal.

B. Construct of a 22 gauge galvanized steel outer casing, and 26 gauge galvanized, perforated steel inner liner. Seams and joints of outer casing to be air tight.

C. Fill annular space between outer casing and inner liner with acoustic fill that is inert, inorganic, and of a density sufficient to obtain the specified acoustic performance. Material must meet requirements of NFPA 90A with a flame spread index of 25 or less and smoke developed rating of 50 or less.

D. Acoustical and aerodynamic performance is indicated on schedules on the drawings.

2.10 HOODS FOR INTAKE AND EXHAUST

A. Manufacturers: Acme, Ammerman, Carnes, Cook, Greenheck, Louvers and Dampers, Penn, or approved equal.

B. Use low silhouette type hoods or louvered penthouse type hoods with drainable blade louvers, as shown on drawings.

C. Construct hoods of aluminum (mill finish) or galvanized steel with a baked enamel finish; color to be selected by the Architect during the submittal stage.

D. For hoods and louvered penthouses maintain minimum 30 inches from bottom of air intake to finished roof.

E. Provide accessories as shown on drawings.

2.11 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.

2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.

2. Downstream from manual volume dampers, control dampers, and equipment.

3. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors; and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.

4. At each change in direction and at maximum 50-foot spacing.

5. Upstream of turning vanes.

6. Elsewhere as indicated.

I. Install access doors with swing against duct static pressure.

J. Access Door Sizes:

1. One-Hand or Inspection Access: 8 by 5 inches.

2. Two-Hand Access: 12 by 6 inches.

3. Head and Hand Access: 18 by 10 inches.

4. Head and Shoulders Access: 21 by 14 inches.

5. Body Access: 25 by 14 inches.

6. Body plus Ladder Access: 25 by 17 inches.

K. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

L. Install flexible connectors to connect ducts to equipment.

M. For fans developing static pressures of 5-inch wg and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

N. Connect terminal units to supply ducts directly or with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

O. Connect diffusers or light troffer boots to low-pressure ducts directly or with maximum 60-inch lengths of flexible duct clamped or strapped in place.

P. Connect flexible ducts to metal ducts with adhesive plus sheet metal screws.

Q. Install duct test holes where required for testing and balancing purposes.

R. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.

2. Inspect locations of access doors and verify that purpose of access door can be performed.

3. Operate fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.

4. Inspect turning vanes for proper and secure installation.

15766 HANGERS AND SUPPORTS:

Horizontal rectangular ducts shall be supported by hangers as follows:

Duct Size-Long Dim.	Hanger Size & Type	Maximum Spacing
60" or less	1" x 18 gauge	8'-0"
61" and over	3/8" dia. rod	8'-0"

Bands shall be bent over one inch from end and turned under the corners of rectangular ducts and fastened with self-tapping screws at corners and at 6" intervals up the sides. Rod hangers shall be secured to bottom bracing angles with nuts and lock nuts. Hanger material shall be galvanized steel, 1" minimum 16 gage.

Upper ends of hangers shall be secured to floor or roof construction above by a method which will develop the full strength of band or rod.

Duct system shall be supported at all turns and transitions and at not more than 6 feet on center for ducts up to 24 in. maximum dimension.

All round ducts shall be supported by hangers 1" minimum width of 16 gauge galvanized strap, or rods. Hangers shall be attached to ducts with self tapping sheet metal screws, pop rivets, or nuts and lock nuts. Upper ends of hangers shall be secured to floor or structural member above by a method which will develop the full strength of band or rod.

This contractor shall furnish and install all miscellaneous metal required for the proper hanging of duct work.

15770 GRILLES AND DIFFUSERS:

Furnish and install ceiling diffusers, supply and return air and exhaust grilles and registers as noted on plans and in schedules. Provide all volume control and adjusting devices as called for in schedules, all supply diffusers shall be equipped with volume controls. Grills, registers and diffusers shall be as manufactured by Metal Industries, Carnes, Titus, EH Price, Tuttle & Bailey, Nailor Industries, or approved equal. Round neck adapters are to be provided where required.

Unit offered as substitutes to those used in the layout of the system shall show suitable air distribution and performance. Final approval will be reserved, pending satisfactory performance on job.

Ceiling diffusers to be lay-in or surface mounted as ceiling type dictates. Finish to be off white baked enamel.

15810 DUCT INSULATION

All supply, make-up and return ducts to be insulated unless noted otherwise on drawings. All ductwork routed in unconditioned spaces shall have 2" blanket insulation, or 1" duct liner as outlined below.

Insulation required for conditioned air ducts shall be as listed below:

A. EXPOSED DUCT:

Exposed supply, return, and make-up (o/a) duct within equipment rooms shall be wrapped with 2” ductwrap. Exposed spiral or rectangular supply or return ductwork in the area served by the ducts, shall be un-insulated, unless noted

otherwise on drawings or in ductwork specifications. Exposed, outdoor ductwork to be insulated as described on drawing details.

B. CONCEALED DUCTS:

Rectangular supply, return, and fresh air make-up ducts concealed in ceiling spaces within building envelope shall have 2” duct wrap. All round supply and return metal ductwork to be insulated with 2" ductwrap.

Exhaust Ducts shall be un-insulated.

C. BLANKET INSULATION:

Blanket type insulation shall be 3/4 lb. density fiberglass having a vapor barrier jacket of .002 inch high aluminum foil laminated and reinforced with paper or glass fibers (minimum R = 6.5).

Vapor barrier jacket shall be overlapped not less than 2 inches at all joints by cutting back insulation and lapping jacket to form a smooth tight joint scaled and cemented down with a suitable noncombustible adhesive. Insulation shall be secured to ducts with weld pins or metal stick clips and speed washers spaced at not over 12" o.c. each way.

15822 AUTOMATIC TEMPERATURE CONTROLS:

Furnish and install a complete system of electric temperature controls as specified herein. Controls shall generally be packaged, programmable controls with the ability to interface with facility ems in the future (i.e. BacNet cards or BacNet Thermostats (where applicable) shall be included for full unit integration of all control / programming / monitoring "points" in the future). Replacement parts for all control components shall be kept in stock locally.

Generally all equipment to be furnished with packaged, standalone controls per schedules and information on drawings (programmable thermostats, control dampers, packaged interface equipment / modules). Packaged equipment to generally be for standalone operation (i.e. no interface to a building energy management system). Mechanical Contractor shall be responsible for setup and programming of all controls per manufacturer's recommendations. In addition to packaged controllers, t'stats / sensors, etc. at all equipment, BACNET cards for and controls for future integration of all equipment to owner's energy management system. Local Packaged Controls Systems to be accessed via factory packaged keypads, or interface devices – coordinate mounting locations / access with owner. Controls to be by Trane, or approved equals by Carrier, Johnson or Daikin. All packaged controls, devices, etc. to be full programmed by this contractor. Occupancy schedules to be coordinated with the Owner.

Provide solid state heating - cooling auto-changeover, 7-day programmable thermostats for space temperature control for fan coil split systems. Thermostats to have dual setpoints (heating / cooling).

Thermostats shall be equipped with switches to provide for continuous fan operation, or Auto fan operation and system Off-Heat-Cool-Auto, and be compatible with equipment furnished. Fan shall run continuously for all rtu's during "occupied" periods.

Program control for designated toilet exhaust fans to be via associated zone programmable thermostat (wired – in at auxiliary contact(s)).

Packaged digital controllers to be provided for all miscellaneous exhaust systems, and all other equipment as required.

Any control devices shall be located for convenient access and function if not specifically located on drawings, including all conduit and wiring required to be furnished and installed by this contractor. All thermostat and operable controls devices shall be located not higher than 48" AFF.

Furnish a complete control wiring diagram including written description and sequence of operation; train in operation and adjustment.

All control wiring shall be in accordance with electrical specifications.

The system shall be complete in all respects including all labor, materials, equipment and services necessary, and shall be installed by personnel regularly engaged in this type of work. The system shall include all appurtenances whether or not specifically implied or expressed herein or on the contract drawings.

All electrical signal wiring together with all field control wiring whether a part of the automation system or not shall be provided for all equipment in the mechanical section as a part of the work of this section.

Controls shall be installed, connected, checked out, and calibrated by this contractor, complete in all respects

Units shall be furnished with packaged control equipment. Wire in strict accordance with manufacturers recommendations, providing any and all wiring and conduit required to connect the various components together. System shall meet all N.C. Energy Code and ASHRAE 90-89 requirements.

Equipment to include all integral safety control devices as required. Supply and exhaust fans shall be “on” at all times when associated areas are in “occupied” mode.

Furnish a complete control wiring diagram from the manufacturer including written description and sequence of operation; train in operation and adjustment.

All control wiring shall be in accordance with electrical specifications and NEC.

The system shall be complete in all respects including all labor, materials, equipment, auxiliary relays, power transformers, and services necessary, and shall be installed by personnel regularly engaged in this type of work. The system shall include all appurtenances whether or not specifically implied or expressed herein or on the contract drawings.

All electrical signal wiring together with all field control wiring whether a part of the automation system or not shall be provided for all equipment in the mechanical section as a part of the work of this section.

AHU’s and split system units, shall be furnished with packaged control equipment as provided by the manufacturer; and field installed equipment / components, as required. Wire in strict accordance with manufacturer's recommendations, providing any and all wiring and conduit required to connect the various components together.

Installation, Submittals and Warranty:

Any control devices shall be located for convenient access and function if not specifically located on drawings, including all conduit and wiring required to be furnished and installed by this contractor. All thermostat and operable controls devices shall be located not higher than 48" AFF.

The system shall be complete in all respects including all labor, materials, equipment and services necessary, and shall be installed by personnel regularly engaged in this type of work. The system shall include all appurtenances whether or not specifically implied or expressed herein or on the contract drawings.

All electrical signal wiring together with all field control wiring whether a part of the automation system or not shall be provided for all equipment in the mechanical section as a part of the work of this section.

System offered as substitute to that used for design shall have suitable performance and final approval will be reserved pending satisfactory performance on the job. Replacement parts for all control components shall be kept in stock locally. Furnish a complete control wiring diagram including written description and sequence of operation.

The system shall be complete in all respects including: proper application, materials, equipment, auxiliary relays, power transformers, and services necessary, and shall be installed by personnel regularly engaged in this type of work. The system shall include all appurtenances whether or not specifically implied or expressed herein or on the contract drawings, and be installed complete in full accordance with manufacturer's recommendations.

All controls to be adjustable and exact setpoints determined and adjusted in building conditions in field.

The Mechanical Contractor shall include in his bid the services of the Controls system manufacturers factory trained field representative to check-out, start-up, calibrate, and adjust system. As part of the check-out and start-up service, field representative shall prepare a complete zone list of all devices and also a list of all settings. This information shall be included in contractor's operation and maintenance manuals. Field representative shall instruct Owner's representative completely in system operation. Field representative shall certify in letter form to the Engineer that all devices have been completely checked, calibrated and adjusted, and that all devices are functioning properly, and installed per manufacturer's installation instructions. Include in letter to Engineer name of Owner's personnel instructed in system operation.

The controls installer shall submit a complete wiring, logic, and schematic diagram for approval before installation. A written sequence of operation and flow diagram shall be included with control and wiring diagram showing all controls, functions, interlocks, wiring, etc., for approval; submittal shall be on sepia, if drawings are over 11" x 17" in size.

Upon completion of control installation, 1 sepia of control diagrams shall be sent to the Engineer, the control manufacturer shall thoroughly check and calibrate the control system and place it in working order as specified and to the Engineer's satisfaction. The contractor shall include in his contract complete instructions and necessary control data to the maintenance personnel on the installed control system. The control manufacturer shall then certify in letter form to the Engineer and Architect that all control requirements have been met and that all control components are calibrated and in working operation as specified and names of Owner's personnel instructed. All control settings shall be appropriately marked inconspicuously beside dampers, knobs, and adjustments, permanently. All relays to visually indicate energized/de-energized position or contain integral pilots. Post at each panel up-to-date, as installed, reduced control drawings; see previous section of specifications concerning instruction and parts manuals, warranties, service, etc.

Service and Warranty:

After installation, system start-up shall be performed. All controls and related components will be adjusted. The equipment being controlled by the system controls shall be in operation and fully inspected. The control system herein specified shall be free from defects in workmanship and material under normal use and service. If within 12 months from date of acceptance by owner/engineer, any of the equipment herein described is proved to be defective in workmanship or material, it will be repaired, adjusted or replaced free of charge by the installing contractor.

After completion and check of system, provide a minimum of (1) day training program for Owner's representative which shall stress operation of complete control system. During this period, log all temperatures, and temperature drops/rises across equipment hourly, stabilizing set down 5°, stabilize set up 10° stabilize, reset to original setpoint, stabilize and log.

15880 ADJUSTING, BALANCING, TESTING AND INSPECTION:

A. GENERAL

The testing and balancing of the heating, ventilating, and air conditioning systems shall be performed by an independent balancing agency approved by the Engineer. The test and balance shall be under the mechanical contract. The balancing agency shall have a minimum of five years' specialized experience in air and hydronic system balancing, and possess calibrated instruments, qualified test-and-balance engineers, and skilled technicians to perform all required tests. The balancing agency shall be either AABC or NEBB certified. The balancing agency shall provide proof of having balanced successfully at least five projects of similar scope and size.

The Mechanical Contractor shall keep a service technician on the job full time for the entire period that the test and balance technician is to coordinate work, assist in balancing and adjusting efforts, make corrections/changes indicated, and to communicate status and receive direction from the designer.

The personnel and procedures utilized shall comply with all standards as set forth by a national balancing organization, shall utilize AABC or NEBB procedural standards and forms, and ASHRAE Handbook chapter on Testing, Adjusting, and Balancing.

The tests shall demonstrate the specified capacities and operation of all equipment and materials comprising the systems. The balancing agency shall then make available to the Engineer such instruments and technicians as are required for spot checks of the system.

The Engineer shall be notified in advance of all tests and inspections, so they may be able to witness such tests and inspections.

The balancing agency shall be submitted for approval within twenty (20) days of notice of award. Within 8 weeks of approval of the balancing agency by the Engineer, the balancing agency shall submit to the Engineer via the Mechanical Contractor three copies of a complete system test plan, to include copies of forms to be used, with equipment designations from plans, indicated; and instrumentation list with calibration dates included. This submittal shall also indicate that the balancing agency has reviewed the Contract Documents to ensure that all necessary dampers, balancing valves, and other devices required for correct balance and adjustment of the system are provided for and note any potential problem areas.

During construction, the balancing agency shall inspect the installation of pipe systems, sheet metal work, temperature controls, HVAC equipment, and other component parts of the system. The inspection shall be performed periodically as the work progresses. A minimum of two inspections are required as follows: (1) when 60 percent of the ductwork is installed; (2) when 90 percent of the equipment is installed. The balancing agency shall submit a brief written report of each inspection to the Engineer via the Mechanical Contractor.

The balancing agency shall witness start-up and tests for all major HVAC equipment. Copies of test reports, including manufacturer's start-up check lists included in manufacturer's installation instructions, shall be included in the Test-and-Balance report.

System balancing and testing shall not begin until system has been completed and is in full working order. This contractor shall put all HVAC systems and equipment into full automatic operation and shall continue such operation throughout the testing and balancing period. Adequate time shall be allowed in the construction schedule for completion of all specified testing and balancing within the contract completion date, and prior to requesting final inspection.

During system balancing and testing, field data in rough form shall be forwarded daily to the Engineer. The balancing agency shall coordinate and review worksheets and findings daily with the Engineer as testing and balancing progresses to obtain direction for adjustments. The balancing agency shall notify the Engineer daily of any controls found inoperative, out of calibration, or otherwise needing adjustment. Any critical deviation of equipment capabilities or performance from design and specification requirements shall be immediately reported to the Engineer for his action, and noted in the Test-and-Balance report, together with recommendations for efficient and economical correction of the deficiency.

Once system balancing and testing is completed, provide a minimum of one day's training program for the Owner's designated personnel which shall stress operation of the complete control system. During this period, log all temperatures, and temperature drops/rises across equipment hourly. Allow system to stabilize; set down 5 degrees, stabilize; set up 10 degrees, stabilize; return to original setpoint, stabilize; and log at each setting. Transmit rough logs to Engineer within 24 hours of completion of this test, including names of Owner's personnel present.

The balancing agency shall cooperate with the controls sub-contractor, and shall certify the following in writing to the Engineer via the Mechanical Contractor prior to requesting final inspection:

(1) Certify that all system components are installed in accordance with the plans and specifications and are functional in accordance with the specified control sequence, including all electrical interlocks, damper sequences, air and water reset controls, fire and freeze stats, and all other safety and operating controls;

(2) Certify that all control instruments are calibrated and set for design operating conditions; and

(3) Verify the accuracy of the final settings and operation of control sequence in automatic operation by recording space temperature in a typical conditioned space for each separately controlled zone for a minimum of 48 hours of system automatic operation, and transmit chart recordings to the Engineer within 24 hours of completion.

Energy Balance and Performance Test: Measure the inlet and outlet temperatures and flow rates of each fluid on each chiller, boiler, and air handler coil, and determine the BTU input and output. Measure volts and amps and determine KW input as applicable.

Prior to Owner's occupancy of the project, train the Owner's authorized personnel on how to operate, start-up, shut-down, and service the various parts of the system, and furnish Engineer a letter stating this has been done to Owner's satisfaction and listing names of Owner's personnel so instructed.

The settings of dampers, splitters, valves, pulleys and other volume adjusting devices and flow meter readings shall be permanently marked after completion of balancing and adjusting, so that they can be restored if disturbed at any time. The balancing agency shall verify that all switches, starters, control devices, relays, night and day thermostats, overcall switches, and other equipment are identified as specified with approved nameplates, and all setpoints marked. The balancing agency shall verify that the locations of all dampers, valves, etc., located above lay-in ceilings are accurately marked by color-coded marker dots on the ceiling grid as specified.

The Controls sub-contractor shall include a warranty of one year, after acceptance of system, during which time the Engineer at his discretion may request a re-check, program revisions, re-setting of any loops sequence, fine tuning, optimizing, etc., or reconfiguration. The controls sub-contractor shall provide technicians and equipment necessary to assist the Engineer in making any tests, or adjustments he may require during this period of time without additional cost.

The balancing agency shall include a warranty of one year, after acceptance of test and balance work, during which time the Engineer at his discretion may request a re-check, or re-setting of any outlet, fan, pump, etc., as listed in the Test-and-Balance report. The balancing agency shall provide technicians and equipment necessary to assist the Engineer in making any tests or adjustments he may require during this period of time.

The balancing agency shall perform a follow-up inspection of the HVAC system during the opposite season from that in which the initial adjustments were made, make any necessary modifications to the initial adjustments to produce optimum system operation and maintain comfort conditions. The peak design cooling and peak design heating conditions must be determined on these days for the seasons not reported in the start-up. Submit a report of this inspection, including problems noted and adjustments made, to the Engineer. The balancing agency shall notify the Engineer in advance of this inspection.

AIR SYSTEM PROCEDURES

Test and adjust fan speeds to achieve design CFM and SP requirements in all modes of operation. If a fan pulley cannot be adjusted to suit the CFM and SP required, it shall be changed. Lubricate all motor and pulley bearings. Check all belts for proper tension and alignment. Check all motors and equipment for proper rotation.

Measure and record motor speed, current, and voltage, nameplate data, sheave sizes and belt sizes in all modes of operation.

Perform a Pitot-tube traverse of main supply and return ducts to obtain total CFM in each mode of operation (e.g., heating, cooling, economizer, etc.). If a Pitot-tube traverse is not practical, the summation of the outlets or inlets may be used after consultation with the Engineer. Explanation why traverse was not used is to be included on the appropriate data sheet.

Test and adjust system minimum outside air by Pitot-tube traverse in each mode of operation. If a Pitot-tube traverse is not practical, the percentage of outside air may be determined by calculations from the return air, outside air, and mixed air temperatures. Make allowances for heat of compression and motor heat where applicable.

Test and record system static pressures, including suction and discharge static pressure of each fan.

Take wet-bulb and dry-bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.

Test and balance each diffuser, grille, and register to within 10 percent of design requirements. All adjustments are to be made at terminal boxes, trunk ducts or run-out ducts, not at volume control dampers in outlet devices. Adjust all diffusers, grilles, and registers to minimize drafts in all areas.

Adjust heat recovery and exhaust systems and relief dampers to exhaust air quantities specified. Record fan nameplate data, and actual RPM, CFM, SP, and amps at each speed of operation. Verify operation of motor- or gravity-operated backdraft dampers.

TEST AND BALANCE REPORT

The test-and-balance report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed and bound. The report shall be certified accurate and complete by the balancing agency's certified test-and-balance engineer. Submit three copies of the certified test-and-balance report to the Engineer. The report shall be evidence that the system has been tested, adjusted, and balanced in accordance with AABC, NEBB, or ASHRAE standards; are an accurate representation of system performance at the completion of testing and balancing; and are an accurate record of all final quantities measured, to establish normal operating values of the systems.

As part of the report, submit one copy of the contract drawings marked "as-built" to the Engineer. Indicate actual CFM at each grill, static pressures, inlet and outlet water and air temperatures, pressures, GPM at each, and test point codes. Record the following items at each cooling and heating element: inlet and leaving water and air temperatures, pressure drop of each coil or bypass valve, water and air metering device readings. For each pump record operating and discharge air pressures and final TDH. Record identification of all measured points to cross-reference with tabulated data. Verify as-installed locations of all dampers, balancing valves, and other control devices are accurately shown.

The test-and-balance report shall be recorded on report forms conforming to recommended forms in AABC or NEBB standards and as approved by the Engineer in the test plan. As a minimum the report shall include:

Preface - a general description of the system, equipment, and controls, and discussion of any abnormalities and problems encountered.

Instrumentation list - The list of instruments including type, model, manufacturer, serial number, and calibration dates.

System identification - Supply, return, and exhaust openings, zones, traverse points, terminal equipment such as VAV boxes, fans, air handling units, heating/cooling coils, and other equipment shall be identified to correspond to the identification used on the report data sheets. Such identification shall also correspond to the identification on the project drawings, field labels, and owner designations.

Air handling equipment test report forms - Record the following for all air handling equipment in each mode of operation: manufacturer, model number, serial number; all design and manufacturer-rated data; total actual CFM by traverse or other approved method, CFM grill totals; suction and discharge static pressure of each fan; outside air and return air total CFM; actual operating current, voltage, and brake horsepower; motor and fan final RPM; fan and motor sheave manufacturer, model, size, number of grooves, and center distance; belt size and quantity; static-pressure controls final operating set points.

Heating and cooling coil test forms - Record the following items for each heating or cooling coil: manufacturer; all design and manufacturer's rated data; rated and actual water pressure drop through each coil and related GPM; rated and actual static pressure drop across each coil; entering and leaving water temperatures; wet-bulb and dry-bulb temperatures of air entering and leaving each cooling coil; dry-bulb temperatures of air entering and leaving each heating coil.

ELECTRICAL

DIVISION 16000

16001 GENERAL:

A. GENERAL CONDITIONS:

This Contractor's attention is directed to the requirements of Instructions to Bidders, General Conditions and Supplementary General Conditions as bound in the specifications which apply in full to the electrical contract.

B. SCOPE:

Provide all labor, materials, tools, equipment, and transportation, and perform all operations necessary for and reasonably incidental to proper execution and completion of all "Electrical" work, whether specifically mentioned or not, all as indicated, specified herein, and/or implied thereby to carry out the apparent intent thereof. These drawings may be superseded by later revised or detailed drawings, specifications, or sketches prepared by the Designer, as needed for clarification, and this Contractor shall conform to all reasonable coordination requests. All items not specifically

mentioned in the specifications or noted on the drawings, but which obviously are required to make the working installation complete, shall be included automatically.

Electrical Contractor shall furnish and install conduit and power wire, systems for lighting and power, and shall furnish and install raceways for telephone, special systems, fire alarm, special equipment, etc., as called for and described on the electrical drawings or herein, complete and ready to operate in every respect, including connection of equipment furnished by Owner.

C. CODE AND ORDINANCES:

All work performed shall be in accordance with the latest requirements of the 2014 edition of National Electrical Code, North Carolina State Building Code, and all state and local codes, ordinances, rules and regulations, when more stringent requirements are imposed by governing regulations, they must be complied with.

If Contractor notes discrepancies between laws, codes, ordinances, rules and regulations, and the specifications or drawings, each discrepancy shall be called to the attention of the Designer in writing before the bids are submitted. That work which is shown or specified in violation of these rules and regulations shall be done in compliance with the regulations, and no claim for additional cost required to make implied systems complete will be accepted.

D. PERMITS AND FEES:

This Contractor shall secure all permits required for the completion of this contract. He shall obtain and deliver to the Owner all certificates of inspection issued by the authorities having jurisdiction, with Contractor paying cost of same.

E. VISIT TO JOB SITE:

Before submitting a bid, this Contractor shall visit the job site for the propose of thoroughly examining the site and conditions under which the work must be performed. The submission of a bona fide bid will be construed to mean that this Contractor understands and is satisfied with conditions under which the contract must be fulfilled. No extra compensation will be allowed for situations arising from conditions, including charges and requirements for connection to utilities as shown for this project.

F. WORKMANSHIP:

Workmanship in the fabrication, preparation, and installation of materials and equipment shall conform to the best standards of practice of the trades involved. Work shall be performed by

experienced and skilled mechanics under the supervision of a competent foreman. Substandard workmanship will be cause for rejection of work and replacement by this Contractor. All costs associated with providing engineering assistance due to substandard work by the contractor shall be assumed by the contractor including time expended, telephone, and travel.

G. DRAWINGS AND SPECIFICATIONS:

The drawings show the location and arrangement of fixtures, conduits, ducts, and equipment, together with details of connections of certain principal items. The layout shown shall be followed as closely as circumstances will permit, but this Contractor shall lay out his work so as to avoid conflict with other Contractors and trades, and to avoid any unnecessary cutting or damage to walls, floors, and supporting structural members. He shall, therefore, carefully and accurately locate and install at the proper time all necessary sleeves, hangers, inserts, etc. which will be required for the completion of his work, and shall be solely responsible for the accurate and proper location of above items.

This Contractor shall refer to architectural, mechanical, and plumbing drawings and shall cooperate fully with other Contractors and trades while installing conduit, fixtures, and other equipment because of close space limits. In case of conflict, notify Designer before proceeding with installation. Refer to architectural drawings for exact building dimensions and location of partition wall, doors, chases, etc. Electrical drawings are not to be scaled for such dimensions.

The drawings and specifications complement each other and together are intended to give a complete description of the work. Any item of equipment or note of work to be done as shown on plans and not mentioned in the specifications, or mentioned in specifications and not shown on plans, shall be furnished the same as if mentioned or shown in both places. If conflicts exist, then the most stringent method shown or described should apply.

Any switches, controls, or equipment included in this contract work (drawings and/or specifications) that is not specifically shown on drawings shall be located for convenient use and access. Contractor to coordinate all equipment arrangement and lay-out in field prior to beginning any actual installation of his work.

If Contractor notes any discrepancy, omission, or conflict found in plans or specifications, he shall call to the immediate attention of the Designer, prior to receipt of bids.

It is the intention that piping, air ducts and light fixtures are designed and laid out to clear each other. It shall be the responsibility of this Contractor to coordinate his work with that of other trades to avoid any such conflicts. Any conflicts that occur after work of one trade is installed and was not prior coordinated shall be relocated or rearranged at the total expense of this Contractor, as directed by Designer. Any conflicts that cannot be corrected in field by relocation or elevation changes shall

be reported to Designer in writing prior to any installation.

The drawings are not intended to show each and every complete or accurate detail. The figures and writing on drawings shall be taken instead of scaling. It is this Contractor's responsibility to comply with the evident intent for centering and symmetric arrangement. This Contractor shall take all field measurements and be responsible therefore. Exact locations and relations are to be defined in the field and shall be satisfactory to the Designer.

Because of the small scale of electrical drawings it is not possible to indicate all offsets, fittings, and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, and accessories required to meet the conditions.

H. CUTTING AND PATCHING:

This Contractor before installing any of his work shall see that it does not interfere with clearances required for finished walls, partitions, equipment, etc., as shown on mechanical, plumbing, and architectural drawings and details. If any work is so installed and it later develops that the architectural design cannot be followed, this Contractor shall, at his own expense, make changes in his work as directed by the Designer so that the architectural design may be followed.

Any cutting or patching required by the failure of this Contractor to place sleeves and install inserts, hangers, etc., at the proper time, or failure to accurately locate above items, shall be done at Electrical Contractor's expense. This Contractor shall advise General Contractor at proper time an exact location of all roof, wall and floor opening. All such penetrations shall have sleeves.

Any cutting of walls or structures required for the installation of work under this division shall be done by this Contractor. Holes through walls for passage of conduits, etc., shall be properly and neatly sleeved and grouted. All sleeve openings to be appropriately sealed at completion of construction. Sleeves through exterior walls shall be effectively sealed against passage of water.

This Contractor shall properly firestop all floor and wall penetrations utilizing rated assemblies to provide the required fire protection. Firestopping is to be installed in strict compliance with the U.L. through-penetration firestop system(s) applicable or as shown on the plans, or an approved equal. Submit shop drawings showing manufacturer's installation details/sections for approval. Persons installing firestopping shall have on site the approved firestopping submittals during installation, and at final inspection. Firestopping shall be installed per manufacturer's installation instructions and in strict compliance with U.L. rating.

All disturbed areas shall be refinished and left in a finished and matching condition and must meet approval of Designer.

I. TESTS:

The right is reserved to conduct acceptance tests of all equipment, wiring, or any other work furnished under these specifications to determine the fulfillment of special requirements. Such tests shall be conducted in the presence of authorized representatives of this Contractor, Owner, Engineer, and Architect at such time as the Designer may designate. This contractor shall perform all tests, bear cost of same and make adjustments of equipment and wiring as may be deemed necessary by the Designer.

J. ALLOWANCE FOR ADDED WORK:

Before proceeding with any work for which compensation may be claimed or the Owner may claim credit, a detailed estimate shall first be submitted and approved in writing. No claim for addition to the contract sum will be valid unless so ordered and approved by the Owner and Designer, prior to start of work. Any conflicts corrected by relocation or elevation changes do not constitute extra work.

K. AS INSTALLED PRINTS:

This Contractor shall maintain a set of prints, showing exact locations of all relocated equipment, concealed equipment, service accesses, hand holes, underground lines, and all other changes to plans. This set shall be kept current and turned over to the Designer upon completion of the job. Show dimensions to locate all underground conduit and lines from permanent reference points.

L. STANDARDS:

All work performed and all equipment furnished by this Contractor shall be in accordance with applicable standards as published by ANSI, NFPA, and U.L.

M. INCIDENTAL CONSTRUCTION WORK:

All blocking for openings, ducts and pipes in concrete floors, masonry walls, or partitions shall be provided by this Contractor. This Contractor shall do all cutting and fitting of his work and of other work that may be required to make the several parts come together properly and to fit his work to receive or be received by the work of other Contractors as shown upon, or reasonably implied by the drawings and specifications. He shall properly complete and finish up his work after other Contractors have finished as the Designer may direct.

All excavating required for the installation of this system shall be done by this Contractor and shall be unclassified; and backfill shall be accomplished as specified in appropriate section of

specifications.

Chases are prohibited in masonry walls which are not to be plastered or paneled. Set conduit and boxes indicated to be concealed in unplastered or unpaneled masonry walls before walls are constructed in order that walls may be constructed around pipes or ducts. This Contractor shall furnish all sleeves in floors, beams, walls, etc., for each such penetration as needed for installing his work, and installation of sleeves by General Contractor.

Unless otherwise noted, the General Contractor will provide openings and lintels as new construction progresses, but this Contractor shall fully designate his requirements prior to construction. Failure to furnish his requirements prior to building construction and failure to coordinate his work with the building construction shall make this Contractor responsible for removing, replacing and painting building construction as required for installation of his work.

N. CLEANING AND PAINTING:

This Contractor shall at all times keep the Owner's premises, adjoining driveways and streets clean of rubbish caused by this Contractor's operations and at the completion of the work shall remove all the rubbish from and about the premises, all his tools, equipment, temporary work, surplus material and shall leave the work clean and ready for use.

This Contractor shall be required to perform touch-up painting on factory finished equipment installed under this contract where necessary to repair abraded or scarred areas and make a clean and neat installation at the direction of the Designer. All metal exposed to weather shall be properly painted. Any equipment installed exposed to weather shall have all abraded areas cleaned, primed, and be painted one complete coat by this Contractor.

After facility is ready for operation, clean all dirt from all machinery, equipment, fixtures, controls, etc.

O. SUPERVISION

This Contractor shall have in charge of the work at all times during construction a thoroughly competent foreman with extensive experience in the work to be performed under this contract. Anyone deemed not capable by the Designer shall be replaced immediately upon request, and after satisfactory foreman has been assigned, he shall not be withdrawn without the written consent of the Designer.

P. GUARANTEE:

This Contractor shall guarantee all materials, equipment, workmanship and each and every piece of apparatus which he furnished and which he installs under this contract against defects and failures of any nature for a period of one year from date on which the system is accepted. Apparatus furnished by this Contractor shall be guaranteed to be satisfactory when operated under rated conditions in accordance with manufacturer's instructions and to be of size, function, and capacity specified on drawings or in the specifications. Equipment manufacturers shall warrant equipment furnished for this project for same time span as installing contractors warranty period as set above and elsewhere in these specifications. Upon notice from the Designer or Owner, he shall immediately check system, make necessary repairs or adjustments as required; due to faulty workmanship, materials, faults, operation or equipment, without cost to the Owner, and instruct Owner in proper operation, adjustment, and care of systems.

Q. INTERFERENCES:

This Contractor shall cooperate with all Contractors on the building and shall confer with all Contractors installing mechanical work and equipment which may effect or come in contact with this work. He shall make necessary visits to site and examination of other trades to verify dimensions, installation conditions and conflicts, storage facilities, etc.; he shall examine approved shop drawings and arrange his work in proper relationship to other work and apparatus and with the architectural finish in an approved manner.

It is the intent that piping, air ducts and light fixtures are laid out to clear each other; it shall be the responsibility of this Contractor to coordinate his work with that of other trades to avoid any such conflicts. Any conflicts that occur after work of one trade is installed and was not prior coordinated, shall be relocated or rearranged at total expense of this Contractor, as directed by Designer. The conflicts that cannot be corrected in field by relocation or elevation changes shall be reported to Designer in writing prior to any installation.

R. IDENTIFICATION:

All equipment shall be identified and properly marked. All marking must meet Designer's approval. All markers shall be of appropriate size. Minimum letter height 3/16". Each switchgear unit, transformer, panel, contactor, starter, and other piece of electrical equipment shall be identified as to their service. All nameplates shall be engraved laminated phenolic attached with screws.

All disconnect switches, junction boxes, motor controllers, and other equipment requiring electrical power connection shall be marked with voltage present, as appropriate to designate 120,208, volts and single or three phase, as applicable.

Where equipment requiring adjustment, servicing or checking is located above lay-in ceiling panels.

Each ceiling panel is to be identified with a coded marker signifying that it provides access to that particular equipment such as control devices, smoke detectors, junction boxes, etc.

S. MAINTENANCE AND OPERATION INSTRUCTIONS:

Operating and Maintenance Instructions on all equipment shall be provided:

Owner's manuals: Organize owner's operation, maintenance, and installation instructions into sets of manageable size. Bind in individual heavy-duty 3-ring vinyl-covered binders of appropriate size, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Submit four (4) complete copies to the Engineer for review prior to final inspection. Include the following information, with tabs to separate information for each piece of equipment:

Submittal data

Spare parts lists

Manufacturer's operating, installation, and maintenance instructions

Copies of warranties

Wiring diagrams

Report of contractor’s check-out.

Names and addresses of manufacturer's or subcontractors and suppliers.

Provide rack in main equipment room for owner's manual storage. Provide a plastic envelope on the wall of each equipment room with inspection certificates, control diagrams, elementary wiring diagrams, piping schematics, valve lists, etc.

Prior to Application for Final Payment of the contract, this Contractor shall be responsible to train owner's personnel.

Owner training: Train owner's personnel in system and equipment operation and maintenance, including normal and emergency operation, start-up and shut-down, troubleshooting procedures, repair procedures, routine preventive maintenance procedures and frequencies, normal adjustments, safety precaution, warranty terms and procedures, and assistance available from manufacturer's authorized service representatives. Training is to include review of owner's manual information described above. Where required elsewhere in these specifications, training is to be conducted by manufacturer's authorized service representative or factory representative as part of equipment start-up specified. Upon completion of training, the organization conducting training shall submit on its letterhead to the Engineer a letter stating what training was conducted, date of training, names of owner's personnel trained, and name of person conducting training.

The Electrical Contractor will be furnished with manufacturer's shop drawings of equipment to be furnished by others or by the Owner, that are to be connected by him.

Upon acceptance of this letter, and final inspection and approval of this project, the one year warranty period on all equipment and systems installed by this Contractor shall start, from that date.

T. ELECTRICAL WORK BY OTHERS:

Refer to the drawings for the details of locations of circuit breakers, junction boxes, conduits and slack wire required where this Contractor's electrical work terminates and electrical work by others begins.

The Electrical Contractor shall furnish and install all power circuits for equipment furnished by others.

In Mechanical Rooms the wiring by the Electrical Contractor generally shall terminate in a power wiring gutter, disconnect switch, junction box, or electrical panel. From these points power wiring to the equipment furnished by the Mechanical Contractor generally shall be by the Mechanical Contractor.

Power wiring to mechanical equipment outside equipment rooms will generally be run by the Electrical Contractor to a junction box in the vicinity (within 3' of) of the mechanical equipment. Power wiring from that point to the equipment will be generally by the Mechanical Contractor.

Electrical Contractor is to refer to the drawings for location and type of service connections to be provided under the electrical contract.

Where service disconnect switches are required and not furnished as part of the equipment, they shall be furnished and installed by Contractor that furnishes the equipment.

Other Contractor shall furnish and install conduit, boxes, wiring and all items of control for equipment they furnish or Owner furnished equipment.

The Electrical Contractor shall furnish and install all electrical starters, disconnect switches, controls, wiring, and safety devices required for the proper installation and operation of equipment installed under the Electrical contract.

Disconnect switches, controls, and power connections shall be located for convenient access if not specifically located on the drawings.

The Electrical Contractor is to connect and test all other equipment and shall provide powered receptacles, cords and mating caps for equipment that is cord connected.

U. SHOP DRAWINGS:

Upon award of the contract, this Contractor shall submit to the Designer within ten (1O) days, for approval, a list of all proposed subcontractors and materials he proposes (within the three listed manufacturers as equivalent) to utilize for approval by Designer, Contractor to include a submittal schedule/status log listing all items of submittal and shop drawings on AIA Form G712 or similar form, and within four (4) weeks of approval, supply eight (8) sets of shop drawings consisting of detailed drawings or manufacturer's cuts of all manufactured equipment he proposes to use on the job. The drawings or cuts shall show details of construction and arrangement of all pertinent data pertaining to equipment proposed to be furnished. The approval of the Designer shall be obtained before equipment is ordered for delivery.

The purpose of submittals is for the Contractor to demonstrate how the material and equipment this Contractor proposes to provide and install comply with the requirements of the Contract Documents. By submitting Shop Drawings, Product Data, Samples and similar submittals, this Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria and details related thereto, or will

do so, and has checked and co-ordinated the information contained within such submittals with the requirements of the Work, the Contract Documents and the Work of other trades.

Approval of the Designer shall be for general fitness and design only. It will be the duty of this Contractor to verify quantities, dimensions, and details, and determine suitability of equipment for installation in space provided. Approval of shop drawings by the Designer does not relieve this Contractor of the responsibility for coordination, dimensions, quantities or details.

If submittal shows variations from the contract requirements, the Contractor shall note on submittal and shall describe all differences (i.e., increased amperage, horsepower, physical size, capacity, flow, etc.) in writing (on letter of transmittal) separate from notations on submittal shop drawings.

This Contractor shall check and approve shop drawings making such notations and corrections as may be appropriate or necessary to comply with specifications before submission to the Designer. Submittals with variations and/or substitutions as equivalent by the listed manufacturers as specified or by those approved as equivalent 10 days prior to bid (see Materials Section) shall also contain a statement that this Contractor has coordinated same with other Contractors and Designers affected and list any changes required, refer to Materials Section.

Shop drawings and/or submittal data shall be submitted on items listed as follows:

Wiring Devices

Electrical Distribution Equipment

Fire Alarm Systems

Conduit & Wire

Firestopping for all Penetrations Applicable

V. TEMPORARY UTILITIES:

All necessary utilities such as water and electricity shall be furnished by General Contractor during construction.

This Contractor shall provide and maintain for duration of job all temporary construction power distribution panels 120/240 Volt 1 Phase and sufficient outlets throughout project spaced no greater than 100 feet apart, and wired per 2014 edition of National Electrical Code, and required temporary lighting for construction.

Temporary lights shall be equipped with guards and not suspended by their cords, unless so approved. Permanent light equipment may be used for this purpose but must be thoroughly cleaned

at completion of job by this Contractor, and new lamps installed.

Walkways shall be kept clear of cords. Extension cords shall be grounding type and without splice.

All switches and disconnects shall be plainly marked.

Temporary lighting to maintain minimum level of five (5) foot candles in all general construction areas, and three (3) foot candles in all excavation and concrete placement areas, at all times that work is in progress and when natural illumination provides lower lighting levels than above specified.

Temporary lighting to be provided by use of Daniel Woodhead #300 fixtures, Whitney-Black 732-1290, Duraline fixtures and guards, or equal, with guards and maintained with 200 watt lamps, and located in areas to provide illumination specified above.

General Contractor to pay for power consumed and Utility Company Up-Down charges.

W. EXISTING FACILITIES:

Every precaution shall be taken to prevent damage to existing underground lines and structures and public utilities. Damage to existing water and sewer lines, culverts, service connections, underground cables, and similar surface and sub-surface structures shall be at the expense of this Contractor, which shall be completed without delay.

The locations of any existing underground utilities that are shown are in an approximate way only and have not been independently verified by the Owner or its representative. The Contractor shall determine the exact location of all existing utilities before commencing work, and agrees to be fully responsible for any and all damages which might be occasioned by the Contractor=s failure to exactly locate and preserve any and all underground utilities.

X. ADAPTATION OF WORK TO EXISTING CONDITIONS:

It is reasonably implied that this Contractor is to furnish all labor and materials to provide Owner with a new and satisfactory system in these facilities. This Contractor is to include necessary work for adaptation of equipment to conditions that may be found to produce conflicts during construction. When any such conditions are encountered, this Contractor is to consult with Designer and then modify installation as directed without additional costs, and to include any incidental materials required.

Y. STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT:

The Electrical Contractor shall be responsible for furnishing suitable shelter and protection for all materials and equipment stored on the job.

Equipment shall be protected from damage from any source both during storage and after installation until completion of the job. No damaged equipment will be accepted.

Z. CLEAN UP:

The Electrical Contractor shall be responsible for keeping work areas clean and free of trash and debris resulting from his operations.

When work is conducted in occupied areas, clean up shall be accomplished daily and work areas left clean at end of day's work.

When all equipment and systems have been set and ready for use, they shall be thoroughly cleaned, removing all labels, plaster, rust and stains, and left in perfect working order.

AA. DELIVERY AND HANDLING OF EQUIPMENT FURNISHED BY OTHERS:

All electrical equipment furnished by the Owner and others which is to be installed and connected by the Electrical Contractor as hereinafter specified will be delivered and turned over to this Contractor. Storing and protection of such equipment and furnishing of all applicable accessories and miscellaneous fittings to make complete shall be done by the Electrical Contractor.

BB. RESTORATION OF PROPERTY:

This Contractor shall carefully restore all property defaced by operations or acts of any of his agents or employees. Such restoration shall include seeding, sodding, and transplanting of lawns, hedges, ornamental planting, and the repair or replacement of driveways, walks, fences, steps, or other facilities in such a manner as to meet with the approval of the Designer and to be least equal in quality to the original undisturbed work.

CC. PROJECT CLOSEOUT

When this Contractor considers that his work is complete in all respects, per plans and specifications, he shall conduct an inspection of project with office and field supervision personnel and prepare a punchlist of outstanding/incomplete/deficient items of work. This inspection shall include review of all specified documentation, certificates, warranties, and close-out information.

When this Contractor considers the above punchlist to be completed or corrected he shall submit to the Designer, in writing, a request for Final Inspection. The request for Final Inspection shall have as attachments the following items:

-- Punchlist prepared by the Contractor, indicating by check-off all completed items (each item individually checked on the list, not a cover letter stating that all items on attached list are complete);

-- One copy of the Contractor's Maintenance and Operation manuals for review by the Designer;

-- As-built marked prints;

-- Copy of the Certificate of Occupancy issued by the local authority having jurisdiction;

-- Contractor's certificate that he has completed all work, per plans and specifications, that he has installed all items in accordance with manufacturer's installation instructions and all applicable codes, and that all systems/equipment furnished have been tested and are in full working order; (see enclosed Certificate Form);

-- Contractor's certificate that the as-built marked prints he provided are complete and accurate in all respects, and that any deviations from original design plans and/or specifications are clearly and accurately shown thereon, including all change orders;

-- Certification of fire alarm systems per NFPA 72;

-- Letter(s) documenting Owner training in operation and maintenance of systems and equipment.

This Contractor is advised to allow adequate time in the project schedule to complete all work, including all specified testing, check-out, inspections, certifications, etc., prior to the contract completion date listed in the Notice to Proceed or other such notification, and before it is necessary for the Owner to occupy the facility.

Once the Final Inspection has been conducted, the Designer will issue to this Contractor a punch list of outstanding/deficient items. The Contractor will pursue corrective action to complete the Final Inspection punch list in an expeditious manner. Once all items on the Final Inspection punch list are complete, the Contractor is to submit to the Designer a copy of the Final Inspection punch list with all items checked off, attaching any outstanding documentation required. Additional visits by the Designer which may be required because above procedure has not been followed or accomplished; or, which are necessary to check off Final Inspection punch list items will be at the expense of the Contractor.

Refer to the General Conditions for the completion requirements. As a minimum, the following items must be fully complete, and proper documentation submitted to the Designer, before the Owner can be allowed to occupy any portion of the facility:

-- All life safety systems must be fully operational and certified, including fire alarm, emergency power, egress lighting, etc.

-- Approval of the local authority having jurisdiction through issuance of a Certificate of Occupancy.

-- Owner trained in operation and maintenance of systems and equipment.

CONTRACTOR'S CERTIFICATE OF COMPLETION

PROJECT:_____

CONTRACTOR:_____

I hereby certify the following:

a. That the work on the above-referenced project has been completed in accordance with the plans and specifications, and that all equipment and materials provided have been installed in accordance with manufacturer's installation instructions and all applicable codes;

b. That all items on specified contractor's inspection punch list (copy attached) are completed; and all items on designer's punchlist(s) are completed;

c. That all tests and inspections and sub-contractor's certificates and reports specified in the contract documents have been properly conducted and documented as specified, and that all equipment and systems are now completed and in proper working order;

d. That the as-built marked prints submitted to the Designer are complete and accurate in all respects, showing all deviations from original design plans and all other items specified;

e. That the following Owner's personnel were trained in operation and maintenance of equipment and systems installed under this contract (list names of Owner's personnel and date(s) training was conducted), as specified:

_____

_____

_____

(Contractor)

_____

(Title)

_____

(Date)

16100 ELECTRICAL MATERIALS AND METHODS:

Materials and workmanship on all work installed under this contract shall be new and of the best quality and shall conform to the best practice for such work and be installed in accordance with manufacturer's recommendations and instructions, including all hardware and accessories recommended or appropriate. Any work or materials not specifically mentioned in these plans and specifications, but required to make this job a complete and workable system shall be furnished and installed by this Contractor. All materials, fixtures, apparatus and materials and methods of installation shall meet with approval of the Designer.

BASIS OF DESIGN: Certain items of manufactured materials and equipment are cited by manufacturer's or product name and model number. This is to establish a standard of design and quality, and is not intended to be restrictive as to the use of materials and equipment of similar design and equivalent quality by other manufacturers, which may be used subject to the approval of the Designer.

A. Proposed Equivalent Products: Items proposed as equivalent to those cited will be considered by the Designer **up to 10 days prior to receipt of bid,** and shall be subject to the approval of the Designer.

After that date, no equivalent material or substitution will be considered or approved, and all

items shall be as specified.

Approvals to consider a proposed brand as being equivalent are for acceptable quality range and are not intended or to be construed as a detailed review of products, features, accessories, mounting hardware, compatibility with other equipment being furnished and space available. Preceding are the Contractors responsibility to insure a complete and coordinated installation of this product and must be submitted for approval and review as specified for submittal data. The approval to bid a proposed equivalent brand as a acceptable equipment design product does not relieve the contractor of this responsibility.

Equivalent Products proposed for approval for equipment specified must be equal in every respect and this Contractor shall base his proposal on the quality of materials and equipment covered in these specifications and shown on the drawings, complete with all accessories, hardware, features and functions to provide the same satisfactory performance on this project as the specified item or system. If substituted equipment fails to perform satisfactorily, it shall be replaced with the specified equipment as directed by Designer. If required by the Designer, this Contractor shall submit for inspection samples of both the specified and the proposed substitute items for comparison by the Designer and test data from a recognized independent testing laboratory for both pieces of equipment.

Where equivalent products proposed and approved for bidding alter the design or space requirements indicated on the plans, this Contractor shall include all items of cost for the revised design and construction, including the cost of any changes or modifications in structural or architectural details, and/or electric service, and the cost of all allied trades involved resulting from use of equivalent product or equipment. This Contractor is to coordinate and bear all cost where such differences affect other Contractor's work.

B. Material Deliveries: This Contractor shall provide to the Designer as soon as possible, and not later than seven (7) weeks after job is awarded, copies of factory acknowledgements of orders of all major items of material, i.e. panelboards, light fixtures, controls, special systems, etc. These acknowledgements should show date of factory entry and delivery dates promised by the supplier and be updated as job progresses or changes occur. Subsequent monthly applications for payment will not be processed for payment until above information is received each month.

C. TESTING AGENCY APPROVAL OR LISTING:

1) All fabricated assemblies of electrically operated equipment furnished under this contract shall have approval and listing of recognized third party agencies currently accredited by the NCBCC to label electrical and mechanical equipment , or other agency satisfactory to authority having jurisdiction; in every case where such

approval and listing has been established for said assemblies or equipment.

2) All manufactured items of electrically operated equipment shall have approval and listing of recognized third party agencies currently accredited by the NCBCC to label electrical and mechanical equipment , or other agency satisfactory to authority having jurisdiction; in every case where such approval and listing has been established for said items of equipment.

16110 CONDUITS AND RACEWAYS:

All wiring will be in conduit or other approved raceways except as shown on the drawing or otherwise specified, and will be concealed unless otherwise noted.

Conduit sizing on plans based on type THHN/XHHW conductor insulation.

Conduit will either be rigid galvanized steel, rigid P.V.C., galvanized electrical metallic tubing, steel flexible, or intermediate grade steel as applicable.

Minimum size conduit for Telephone, Data, CATV, and Fire Alarm shall be 3/4".

In general, all interior raceways above grade will be electrical metallic tubing, and all raceways under slabs inside building will be rigid P.V.C. or steel. Conduits will not be run in slab without permission of Structural Engineer.

P.V.C. may not be used in "Areas of Assembly", except where run under slab and turned up into boxes concealed in masonry wall.

Rigid steel conduit will be utilized where conduit is exposed and subject to damage.

E.M.T. will be utilized for all interior work; and for all interior telephone raceways, unless installed below slab where PVC may be used.

Rigid P.V.C. Conduit will be utilized for exterior work below grade, and shall always have Allen or Brady marker tape placed above, 6" below finished grade.

Rigid steel or PVC conduit shall be installed where routed in poured concrete, in exterior masonry walls, or in wet locations.

Conduits shall not be installed in slabs without the written permission of Architect and/or Structural Engineer.

Minimum depth for exterior buried raceway is 3' below finished grade.

Flexible conduit shall be used for motor, transformer and lay-in fixture connections. Length shall be limited to 24" for motors and 6 feet for fixtures. Where exposed to moisture, P.V.C. coated "Sealtight" shall be utilized. Provide insulated green bond wire.

Fittings for E.M.T. shall be as follows:

Plated hexagonal steel compression type, or steel set screw type **insulated throat**.

No pot metal or die cast types permitted.

No "indentor" type devices permitted.

Where P.V.C. raceway is utilized in lieu of metallic raceway, a copper bonding conductor shall be provided, sized per N.E.C.

Conduit may be run exposed only in mechanical room and where specifically noted on drawings and

may be deemed necessary and approved by the Designer, and it shall follow exactly the location as shown. All exposed conduit runs shall be so located that pull or junction boxes will not be made inaccessible due to inadequate clearance with piping or equipment immediately below or adjacent to be installed under this contract.

All conduits used for service entrance feeders from supply point to first overcurrent device shall be bonded with suitable bonding locknuts and/or bonding insulating bushings as manufactured by T & B. O.Z., or Appleton, or by separate copper bonding conductor.

In finished areas where conduit cannot be concealed, surface raceway such as Walker or Wiremold and fittings shall be used, with specific installation and routing approved by Designer. Manufactured appropriate fittings shall be utilized as applicable.

16115 SURFACE RACEWAYS/ WIREWAYS:

A. GENERAL:

Scope

The raceway system shall consist of raceway, appropriate fittings and device boxes to complete installation.

Raceway system shall include, but not be limited to, all hardware, mounting devices, adapters, clips, inside and outside corners, offset sections, connectors, end caps, covers and nipples.

Conductors shall be carefully installed in raceway and boxes to prevent nicking conductors' insulation.

Surface raceway is to be utilized in dry interior locations only as covered in Article 352 Part A of the National Electrical Code, as adopted by the National Fire Protection Association and as approved by the American National Standards Institute. The Raceway System shall be listed by Underwriters' Laboratories.

B. PRODUCT:

Manufacturer

The surface raceway system specified herein shall be as manufactured by The Walker/Wiremold Company, Panduit, T& B, Carlon, Hoffman or other approved equal. Systems of other

manufacturers may be considered equal if, in the opinion, and the written approval of the engineer, they meet all the performance standards specified herein.

Materials

Metal Raceways: The raceway and all system components must be UL Listed. They shall be manufactured of steel; zinc plated, galvanized and/or finished in manufacturers standard color topcoat over gray primer base and shall be suitable for field repainting to match surroundings. The raceway shall be a one-piece design with a base and cover factory assembled. The raceway shall be available in 5' lengths.

Non Metal Raceways: The raceway and all system components must be UL Listed, two piece construction of rigid PVC or polymer compound with matte texture and manufacturers standard color.

Fittings. A full compliment of fittings must be available including but not limited to mounting clips and straps, couplings, flat, internal and external elbows, cover clips, and bushings. The fitting covers shall be painted with an enamel finish, manufacturers standard color to match the raceway. They shall overlap the raceway to hide uneven cuts. All fittings shall be supplied with a base where applicable. A transition fitting shall be available to adapt to other raceways.

Device and Fixture Boxes. Device boxes shall be available for mounting standard devices and faceplates. A device box shall be available in single and multiple gang configurations,

up to six gang in some cases by the use of an adaptor fitting. Extension boxes shall be available to adapt to existing standard flush switch and receptacle boxes. All device and fixture box covers shall be painted with an enamel finish, manufacturers standard in color to match the raceway cover.

Metal Wireways: Sheet metal sized and shaped as indicated, NEMA 1 , Including couplings, offsets, elbows, expansion joints, adapters, hold down straps, end caps, and other fittings to match and mate with wireways as required fro complete system. Covers to be screw type. Finish to be manufacturers standard enamel.

C. EXECUTION:

Installation

Installer shall carefully layout the surface raceway system prior to and during installation to minimize offsets and superfluous fittings. Refer to manufacturer's list of standard components.

1) Mechanical Security. All raceway systems shall be mechanically continuous and connected to all electrical outlets, boxes, and cabinets, in accordance with manufacturer's installation sheets.

2) Electrical Security. All metal raceway shall be electrically continuous and bonded in accordance with the National Electric Code for proper grounding. A separate grounding conductor shall be routed with ungrounded conductors.

3) Raceway Support. Raceway shall be securely mounted to wall and supported at intervals not exceeding 3 feet. Toggle bolts or other approved anchors shall be utilized for means of attachment in tile or hollow wall construction. Lead anchors with screws in solid concrete applications.

4) Completeness. All raceway systems shall be installed complete, including insulating bushing and inserts where required by manufacturer's installation sheets. All unused raceway openings shall be closed.

16120 CONDUCTORS:

This Contractor shall furnish and install all wire and cable necessary to complete the work herein outlined and as shown on drawings, except such items as are specifically noted as being furnished by others. All wiring in the entire system must be color coded and all conductors shall have their size, voltage, manufacturer, and type clearly marked on the outer covering. All wire and cable shall be as herein specified or as shown on the drawings. Wire and cable shall be as manufactured by Okonite, Rome, Triangle, Southwire or approved equal.

A. CONDUCTORS:

Conductors shall consist of annealed copper wire of size indicated on drawings or as may be specified herein. No conductors smaller than #12 AWG copper shall be used, except as noted. All conductors up to conductors up to and including #10 AWG shall be solid copper and all conductors of #8 AWG and larger shall be copper of size indicated on drawings or as may be specified herein, Class B concentric stranded construction.

B. WIRE INSULATION:

All wire and cable unless otherwise specified shall be single conductor type XHHW, THW or THHN 600 volt insulation. Fixture drop wire to lighting fixtures shall be type AF. Where branch circuits are fed through fluorescent channels, type XHHW or type RHH wire may be used. Conductors shall be color coded - Black, red, blue, white on 208/120 volt systems, brown ,orange yellow on 480/277 volt systems.

Conductor sizing on drawings based on 75 deg c. rating of insulation.

C. INSTALLATION:

The Designer reserves the right to inspect any and all joints in wiring. If joint is already taped, Contractor will properly retape after inspection.

Conductors shall be continuous without joints or splices in runs between outlet boxes. All splices shall be made at boxes only.

D. SPLICES AND TERMINATIONS:

Splices shall be made by use of mechanical connectors of the following manufacturers' types: T & B, "Sta-Kon"; Burndy, "Crimpit"; Minnesota Mining & Manufacturing Co., "Scotchlock" Ideal, "Wing-Nuts". Conductors size #8 AWG and larger shall be spliced and connected with suitable solderless, mechanical lugs and connectors, such as T & B "Lock-Tite".

All splices, taps, and connections shall be insulated with Scotch electrical tape as made by Minnesota Mining & Manufacturing Company as applicable to installation.

16141 SWITCHES AND RECEPTACLES: Commercial

A. SWITCHES:

Switches shall be Bryant 4900, P & S 20AC1, Eagle 2221 or Leviton 1200, Series two, three or four-way as specified on drawings, 120/277 volt 20 amp., mounted 4'-O" A.F.F.

B. RECEPTACLES:

Receptacles shall be Bryant 5252 ,P& S 5252, Eagle 5252 or Leviton 5252, 15 amp., 125 volt, grounding type unless specifically noted on drawings.

Receptacles shall be grounded and bonded per N.E.C., Section 250-74.

Receptacle Wring: Connection to receptacle terminals shall be by single conductors to terminals, pigtailed from branch circuit conductors. **Use of receptacle terminals to loop circuits shall not be permitted.**

C. SPECIAL PURPOSE OUTLETS:

Receptacles with special configuration as shown on plans may be as manufactured by Hubbell, Bryant, Leviton, Eagle or Pass & Seymor or other approved equal in addition to numerical designation shown on plans.

16150 MOTORS/EQUIPMENT TESTING:

Furnish power wiring and disconnect switch for all equipment furnished by others.

This Contractor to furnish and install all disconnect switches where shown or required.

Inspect and clean all contacts if required in control panels, starters, and miscellaneous control devices and make all necessary adjustments and wiring changes as may be required for the proper operation of equipment.

Running tests shall be made on all equipment connected by this Contractor to check proper operation of equipment and verify installation of properly sized overcurrent relays. Such tests shall not be made; however, without the permission of a responsible party designated by the Owner. Tests will be made only in presence of Contractor or others furnishing equipment, if other than Electrical Contractor.

This Contractor shall connect and test all other equipment and shall provide cords and mating caps for receptacles where equipment is cord connected.

16170 DISCONNECT SWITCHES:

1) Switches shall be "Heavy Duty " type - size as called for on the drawings, in N.E.M.A. 1 or NEMA 3R enclosures, "Third Party" listed and labeled, complete with all fuses as required.

2) Switches shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the "on " position.

3) Switches shall have handles whose positions are easily recognizable and are padlockable in the "on" or "off" position.

4) Switches shall have nonteasible, positive, quick make-break mechanisms.

5) Switches shall be properly labeled.

6) Fuses shall be non-renewable and manufactured by Bussman, Little Fuse or Chase-Shawmutt, and where rated above 30 amperes shall be of the dual element "Fusetron" type.

7) Switches to be exterior mounted shall be N.E.M.A. 3R enclosure.

8) Switches shall be provided by this Contractor where required to meet 2011 N.E. Code, or as shown.

9) Switches for air conditioning/heating equipment shall be fusible.

10) Where applicable for equipment with external control voltage source, switches shall be equipped with integral electrical interlocked disconnect switch, one or two pole as applicable.

11) Switches to be as manufactured by Square "D" as scheduled or equals by Cutler Hammer / Westinghouse, General Electric or Siemens - ITE.

16190 SUPPORTING DEVICES:

A GENERAL:

All secondary electrical devices (outlet boxes, speakers, bells, clocks, telephones, poles, bases, switches, receptacles, fixtures, etc.) shall be located generally as shown on drawings. This Contractor shall study the general building plans in relation to space surrounding each device to prevent interferences and when necessary he will relocate devices.

No device utilized by handicapped to be more than 4'-0" A.F.F. to top, unless specifically shown otherwise.

B. OUTLET AND SWITCH BOXES:

Outlet and switch boxes shall be code size and type, made of galvanized sheet steel and shall be properly supported.

Boxes installed in exposed masonry walls shall be a concealed job: intermediate oversize type plates

shall be used where standard plate will not cover opening. All adjacent plates shall match and be intermediate type also. Use of jumbo device plates will be avoided wherever possible. Extra deep boxes to be utilized on all brick areas.

All outlets shall be equipped with a stainless steel plate, type 302, Hubbell series 93000, Bryant Series 93000, P & S Series 93000 or Designer approved equal. All exterior mounted boxes shall have approved weather-proof while in use plates and/or covers. Receptacles in wet locations shall be installed with a hinged outlet cover/enclosure clearly marked ASuitable For Wet Locations While In Use@ and AUL Listed@. There must be a gasket between the enclosure and the mounting surface, and between the hinged cover and mounting plate/base to assure proper seal. TayMac; Specification Grade or engineer approved equal. All surface installed boxes shall have stamped steel device plates.

C. OUTLET LOCATIONS:

All outlets for fixtures, receptacles, switches, intercoms, clocks, telephone, etc., shall be installed in the location shown on the drawings. This Contractor shall study the general building plans in relation to the spaces surrounding each outlet in order that his work may fit the other work required by these specifications and plans as well as the work of other trades.

When necessary, this Contractor shall relocate outlets so that when fixtures or other fittings are installed, they will be symmetrically located according to room layout and will not interfere with other work or equipment. Location must meet approval of Designer or be relocated at no cost addition by this Contractor.

Unless otherwise indicated on the prints, place top of outlet boxes at the following distances from finished floors:

Lighting & Power Panelboards - top of cabinet 6'-6" above floor.

Safety switches and/or circuit breakers - handle not over 6'-6" above floor.

Wall switches -4'-0" above floor.

Receptacles and telephone - l'6" above floor except where noted; and centered 6" above countertop to bottom of plate. Note architectural drawings for splash boards, tile, wainscoat, etc. above counter tops.

Thermostats - 4'-0" above floor.

Lighting Fixtures - as noted on drawings.

Speakers, clock receptacles - 7'6" above floor except where noted.

Boxes beside door shall be mounted so edge of trim is no closer than 2" from edge of door trim, and on strike side.

Fire alarm pull stations - 4'-0" above floor.

Fire alarm horn/lights - 80" to 96" " above floor.

When finished surfaces are brick, glazed tile, concrete masonry or similar material, outlet heights may be varied slightly on approval of Designer to fit into masonry courses with a minimum of cutting.

In roughing-in, all devices mounting heights are to be in compliance with the applicable provisions of the N.C. Building Code Volume 1-C regarding handicapped accessibility.

The Electrical Contractor is cautioned to review architectural, plumbing and heating plans to confirm

location of cabinet work and equipment and to adjust the exact installed location of receptacles and devices accordingly to avoid interferences between electrical devices, tile, and cabinet work or equipment. Responsibility for locating in field is Contractor's and Designer should be contacted for clarification before installation.

Lighting outlets shall be centered or spaced symmetrically as evidently intended, unless they are dimensioned. If any doubt arises, contact Designer for instruction before roughing in.

D. STRUCTURAL STEEL:

This Contractor shall provide miscellaneous structural steel necessary to mount electrical equipment to walls, beams and joists. All structural steel furnished shall be standard shapes and sizes and shall be free from rust and/or scale. All interior steel shall be firmly and rigidly welded or bolted in place. All structural steel shall be structural quality conforming with ASTM A7-497. All exposed or exterior steel shall be painted by this Contractor.

E. TAP AND PULL BOXES:

Boxes shall be of code gauge galvanized sheet steel but not less than 14 gauge metal. Holes for

raceways shall be drilled on the job. Where necessary for boxes to be supported away from the ceiling or beams, strap iron or threaded rod shall be used for supports.

1) Boxes shall have covers fastened on with screws. Sizes of boxes shall be determined by N.E.C. requirements.

2) In concealed wiring areas, install boxes flush with the finished surfaces and provide oversized covers.

3) Access shall be provided as shown on drawings or otherwise required.

4) Panels and boxes in fire rated walls shall be installed such as required to maintain fire wall construction, with appropriate layers of sheetrock or approved fireproofing compound behind them.

F. SECONDARY SYSTEMS:

Furnish and install all conduit, junction boxes, outlet boxes, and plates for conduit systems for telephone, communications, and other miscellaneous systems as shown on plans.

Leave a #14 AWG galvanized steel pull wire in each conduit for future use. Concerning the telephone system, the telephone supplier will furnish and install all telephone equipment such as hand sets, cables, terminal boards, etc.

This Contractor shall conform to their requirements as to bonds, box size, conduit size, power, plates, etc.

All unused outlet boxes shall be equipped with blank plates by this Contractor.

G. SUPPORTS IN DRYWALL OR PLASTER CONSTRUCTION: Outlet boxes, devices, fixtures mounted on drywall or plaster shall be secured using toggle bolts or to backing provided in wall prior to finishing. Plastic insert type devices are not acceptable.

16195 ELECTRICAL IDENTIFICATION

1. Furnish and install engraved laminated phenolic nameplates for all safety switches, panelboards, transformers, switchboards, motor control centers and other electrical equipment supplied for the project for identification of equipment, controlled, served, showing phase, voltage, etc. Nameplates shall be securely attached to equipment with self-tapping stainless steel screws, and shall identify equipment controlled,

attached, etc. Letters shall be approximately 1/2 inch high minimum. Embossed self-adhesive plastic tape is not acceptable for marking equipment. Nameplate material colors shall be:

---- Blue surface with white core for 120/208 volt equipment.

---- Bright red surface with white core for all equipment related to fire alarm system.

---- Dark red (burgundy) surface with white core for all equipment related to security.

---- Green surface with white core for all equipment related to "emergency " systems.

---- Orange surface with white core for all equipment related to telephone systems.

---- Brown surface with white core for all equipment related to data systems.

---- White surface with black core for all equipment related to paging systems.

---- Purple surface with white core for all equipment related to TV systems.

2. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by tags with string or wire attached to conduit or outlet.

3. All outlet boxes,junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface color scheme outlined above. This includes covers above lift-out and other type accessible ceilings.

16452 GROUNDING:

All electrical systems and equipment connected under this contract shall be grounded in strict accordance with requirements set forth in the 2011 edition of the National Electrical Code and local regulations. Specific methods by which such return paths to earth are established may be dictated by local area conditions, system characteristics, or size.

Metal raceways, metal enclosures or electrical devices, switchgear enclosures, transformer frames, and other equipment shall be completely grounded in an approved manner prescribed by the N. E.

Code. All necessary conduit conductors, clamps, connectors, etc., for the grounding system shall be furnished, installed and connected by the Electrical Contractor.

An insulated green equipment grounding conductor, properly sized per NEC shall be run with all circuits

The electrical raceway system shall **not** be relied on for ground continuity.

Bonding shall be provided in accordance with Article 250, Section V of the 2011 edition of the National Electrical Code, and all service equipment shall be bonded up through and including the first overcurrent device.

Continuity shall be copper to copper in all cases

Where P.V.C. raceway is utilized, a properly sized copper bonding conductor shall be provided.

16721 FIRE ALARM SYSTEM:

A. Scope: This contractor shall tie to existing fire detection and alarm system as shown on drawings and described herein.

Systems shall be compatible with existing manufacture, and installed by a local fire alarm contractor who has at least 5 years of experience in installation of fire alarm systems.

B. Code Compliance: All fire and smoke detection and alarm system shall comply with the latest published revisions of NFPA 72, unless otherwise approved by the Engineer. They must also comply with the North Carolina State Building Code, which includes the National Electrical Code.

C. UL Compliance and Labeling: Comply with provision of UL safety standards pertaining to fire alarm systems; and provide products and components which are UL-listed and labeled.

D. Equipment:

1. All wiring shall be color coded in accordance with the following scheme, which shall be maintained throughout the system, without color change in any wire run:

Initiating Circuits, General.....Red (+)/White (-)

Initiating Circuits, Smoke Only.....Violet (+)/Gray (-)

Alarm Indicating Appliance Circuits.....Blue (+)/Black (-)

AHU Shutdown Circuits.....Yellow

Door Control Circuits.....Orange

Elevator Recall Circuits.....Brown

Permanent wire markers shall be used to identify all splices and terminations for each circuit. For splices, use markers or other means to indicate which conductor leads to the FACP.

2. There shall be NO splices in the system other than at terminal blocks. "Wire nuts" and crimp splices will NOT be permitted.

NOTE: All terminal block screws shall have pressure wire connectors of the self-lifting or box lug type.

3. Wiring must be in metal conduit (3/4" minimum diameter), or surface metal raceway, unless waived by the Engineer. It shall be new AWG14 minimum stranded copper, type THHN/THWN. All junction boxes that are visible or accessible shall be painted red, unless

in finished areas.

4. Detection or alarm circuits must not be included in raceways containing AC power or AC control wiring. Within the FACP, any AC control wiring must be properly separated from other circuits and the enclosure must have an appropriate warning label to alert service personnel to the hazard.

5. All connections at the FACP must be made by the manufacturer's authorized, factory trained representative (rather than by the electrical contractor).

6. All wiring shall be checked for grounds, opens, and shorts, prior to termination at panels and installation of detector heads. The minimum resistance to ground or between any two conductors shall be ten megohms, verified with a megger.

E. Submittals: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of fire alarm system equipment. Include operation and maintenance instructions for inclusion in maintenance manuals.

Provide shop drawings showing equipment/device locations and connecting wiring for entire fire alarm system. Include wiring and riser diagrams. Wiring diagrams and risers are to be complete in all respects, showing number and color code of all wiring as well as terminal numbers for panel and junction box terminations.

Identify all zones with area/function served and designation(s) utilized on drawings, on all components and on all drawings or listing data. Panel drawings shall show specific system panel layout with location of all components as well as all terminal blocks for external wiring.

Submit maintenance data and parts lists for each type of fire alarm equipment installed, including furnished specialties and accessories. Include this data in maintenance manual; in accordance with requirements of Section 16001-S.

F. System Testing and Certification

1. Upon completion of the installation, the CONTRACTOR AND THE MANUFACTURER'S AUTHORIZED REPRESENTATIVE together shall test every alarm initiating device for proper response and zone indication, every alarm signaling appliance for effectiveness, and all other functions such as elevator capture and control of smoke doors/dampers, HVAC systems, and pressurization fans.

ALL supervised circuits must also be tested to verify proper supervision. (Control circuits and remote annunciation lines are among those required to be supervised.)

NOTE: The Engineer must be given advance notice of the tests, so that he and/or the owner may witness them if desired.

2. The contractor must submit the following test documentation:

(a) Measured sensitivity of each smoke detector.

(b) NFPA "Fire Alarm System Certification and Description".

After completion of the 100% system test and submission of the above documentation, the contractor will advise the ENGINEER that the system is ready for inspection. The system must operate for at least two days prior to this notice.

Equipment intended for open area protection or releasing device service may be subjected to simulated or actual test fires, in accordance with ANSI/UL guidelines and sound engineering practice, to verify proper response.

After successful completion of check-out, inspections, tests and acceptance, the warranty period begins. In the event of malfunctions or excessive nuisance alarms, the Contractor must take prompt corrective action. The Engineer may require a repeat of the Contractor's 100% system test. Continued improper performance during the warranty period shall be cause to require the Contractor to replace the system with equipment that will function properly.

3. System Documentation, Training, and Maintenance:

The contractor shall provide the Engineer with three copies of the following, to be forwarded to the owner:

(a) As-built wiring and conduit layout diagrams, including wire color code and label numbers, device identification (area/function served), drawing references, and showing all interconnections in the system, including terminal number in panels and at each intermediate terminal block..

(b) Electronic circuit diagrams of all control panels, modules, annunciators, communications panels, etc.

(c) Technical literature on all major parts of the system, including control panels, batteries, detectors, manual stations, alarm indicating appliances, power supplies, and remote alarm transmission means.

The manufacturer's authorized representative must instruct the owner's designated employees in proper operation of the system and in all required periodic maintenance. This instruction will include two copies of a written, bound summary, for future reference.

NOTE: Basic operating instructions shall be framed and mounted at the FACP.

The Contractor must have the manufacturer's authorized representative provide a quotation for regular preventive maintenance, in accordance with the recommendations of NFPA 72, "Guide for Testing Protection Signaling Systems". This will cover the first 12 months period after expiration of the standard warranty.

number in panels and at each intermediate terminal block..

NOTE: Basic operating instructions shall be framed and mounted at the FACP.

16850 HEATING/ AIR CONDITIONING AND VENTILATION:

A. HEATING AND AIR CONDITIONING EQUIPMENT:

Packaged air tempering units, and associated heating and air conditioning equipment will be furnished and installed by the Mechanical Contractor.

The electrical Contractor shall provide power wiring to equipment rooms or junction boxes in vicinity of such equipment.

The Electrical Contractor shall provide power wiring as outlined in section 16001 section "T".

The Mechanical Contractor shall furnish and install all thermostats, starters, controls, conduit, and wiring thereto. The Mechanical Contractor shall furnish fuses as required and overload heater elements for equipment and motors he installs.

F O R M O F P R O P O S A L

Henerson County Animal Shelter HVAC Replacement Contract: HVAC

Henderson County Bidder: _____

Date: _____

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with Henderson County Facility Services, Hendersonville, NC, in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of Henderson County Animal Shelter HVAC Replacement in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the Henderson County Facility Services with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

SINGLE PRIME CONTRACT:

Base Bid:

_____Dollars($)_____

Electrical Subcontractor:

_____Lic_____

General Subcontractor:

_____Lic_____

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

HVAC CONTRACT:

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereto within the time specified in the Supplementary General Conditions Article 23.

Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of _____

_____

(Name of firm or corporation making bid)

WITNESS: By: _____

Signature

_____ Name: _____

(Proprietorship or Partnership) Print or type

Title_____

(Owner/Partner/Pres./V.Pres)

Address_____

ATTEST: _____

By:_____ License No._____

Title:_____ Federal I.D. No. _____

(Corp. Sec. or Asst. Sec. only)

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 ___ Addendum No. 2 ___ Addendum No. 3 ____ Addendum No. 4 ___

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT

_____ as

principal, and _____, as surety, who is duly licensed to act as surety in North Carolina, are held and firmly bound unto the State of North Carolina* through

_____ as obligee, in the penal sum of

_____ DOLLARS, lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated this ____ day of _____ 20__

WHEREAS, the said principal is herewith submitting proposal for Henderson County Animal Shelter HVAC Replacement and the principal desires to file this bid bond in lieu of making the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that if the principal shall be awarded the contract for which the bid is submitted and shall execute the contract and give bond for the faithful performance thereof within ten days after the award of same to the principal, then this obligation shall be null and void; but if the principal fails to so execute such contract and give performance bond as required by G.S. 143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by G.S. 143-129.1

_____(SEAL)

_____(SEAL)

_____(SEAL)

_____(SEAL)

FORM OF CONSTRUCTION CONTRACT

THIS AGREEMENT, made the ___ day of _ _____ in the year of 2023 by and between _____, hereinafter called the Party of the First Part and Henderson County Facility Services, hereinafter called the Party of the Second Part.

WITNESSETH:

That the Party of the First Part and the Party of the Second Part for the consideration herein named agree as follows:

1. Scope of Work: The Party of the First Part shall furnish and deliver all of the materials, and perform all of the work in the manner and form as provided by the following enumerated plans, specifications and documents, which are attached hereto and made a part thereof as if fully contained herein: advertisement; Instructions to Bidders; General Conditions; Supplementary General Conditions; specifications; accepted proposal; contract; power of attorney; workmen's compensation; public liability; property damage and builder's risk insurance certificates; and drawings, titled:

Henderson County Animal Shelter HVAC Replacement

Consisting of the following sheets:

M001, M101, M102, M103, M104, M105 and Structural Letter

Consisting of the following specifications: Mechanical, Electrical

Dated: _____and the following addenda:

Addendum No	1	Dated:		Addendum No.		Dated:	
Addendum No	2	Dated:		Addendum No.		Dated:	
Addendum No	3	Dated:		Addendum No.		Dated:	
Addendum No	4	Dated:		Addendum No.		Dated:	

2. That the Party of the First Part shall commence work to be performed under this agreement on a date to be specified in a written order of the Party of the Second Part and shall fully complete all work hereunder within 60 consecutive calendar days from said date. For each day in excess thereof, liquidated damages shall be as stated in Supplementary General Conditions. The Party of the First Part, as one of the considerations for the awarding of this contract, shall furnish to the Party of the Second Part a construction schedule setting forth planned progress of the project broken down by the various divisions or part of the work and by calendar days. If the Party of the First Part 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 above 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 Party of the First Part 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 Party

of the Second Part may give notice in writing, sent by certified mail, return receipt requested, to the Party of the First Part and his surety of such delay, neglect or default, specifying the same, and if the Party of the First Part within a period of fifteen (15) days after such notice shall not proceed in accordance therewith, then the Party of the Second Part 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 surety shall fail to take over the work to be done under this contract within fifteen (15) days after being so notified and notify the Party of the Second Part 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 Party of the Second Part shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said Party of the First Part, 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 Party of the Second Part, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said Party of the First Part and surety. In case the expense so incurred by the Party of the Second Part shall be less than the sum which would have been payable under the contract, if it had been completed by said Party of the First Part, then the said Party of the First Part and surety 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 Party of the First Part and the surety shall be liable and shall pay to the Party of the Second Part the amount of said excess.

3. The Party of the Second Part hereby agrees to pay to the Party of the First Part for the faithful performance of this agreement, subject to additions and deductions as provided in the specifications or proposal, in lawful money of the United States as follows:

_____ ($_____).

Summary of Contract Award: **Mechanical, Electrical, and Structural as described in Contract Documents.**

4. On or before the 20th day of each calendar month, the Party of the Second Part shall make payments to the Party of the First Part on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the First Party, less five percent (5%) of the amount of such estimate which is to be retained by the Second Party until all work has been performed strictly in accordance with this agreement and until such work has been accepted by the Second Party. The Second Party may elect to waive retainage requirements after 50 percent of the work has been satisfactorily completed on schedule as referred to in Article 31 of the General Conditions.

5. Upon submission by the First Party of evidence satisfactory to the Second Party that all payrolls, material bills and other costs incurred by the First Party in connection with the construction of the work have been paid in full, final payment on account of this agreement shall be made within thirty (30) days after the completion by the First Party of all work covered by this agreement and the acceptance of such work by the Second Party.

6. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bonds hereto attached for its faithful performance, the Second Party shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease to be adequate to cover the performance of the work, the First Party shall, at its expense, within five (5) days after the receipt of notice from the Second Party so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Second Party. In such event no further payment to the First Party shall be deemed to be due under this agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Second Party.

IN WITNESS WHEREOF, the Parties hereto have executed this agreement on the day and date first above written in 3 (three) counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original contract.

Witness:

_____ Contractor: (Trade or Corporate Name)

_____ By: _____

(Proprietorship or Partnership)

Title: _____

(Owner, Partner, or Corp. Pres. or Vice Pres. only)

Attest: (Corporation)

By: _____

Title: _____

(Corp. Sec. or Asst. Sec. only) (CORPORATE SEAL)

The Henderson County Facility Services Department:

By: _____

Title: _____

Date: _____

Witness:

By: _____

Title: _____

Date: _____

FORM OF PERFORMANCE BOND

Date of Contract:

Date of Execution:

Name of Principal

(Contractor)

Name of Surety:

Name of Contracting Body: Henderson County

Amount of Bond:

Project **Henderson County Animal Services HVAC Replacement**

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the

contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness: _____

Contractor: (Trade or Corporate Name)

_____ By: _____

(Proprietorship or Partnership)

Attest: (Corporation) Title: _____

(Owner, Partner, or Corp. Pres. or Vice Pres. only)

By: _____

Title: _____

(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

(Surety Company)

Witness: By: _____

_____ Title: _____

(Attorney in Fact)

Countersigned:

_____ (Surety Corporate Seal)

_____

(N.C. Licensed Resident Agent)

_____

_____

Name and Address-Surety Agency

_____

Surety Company Name and N.C.

Regional or Branch Office Address

FORM OF PAYMENT BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal (Contractor) _____

Name of Surety: _____

Name of Contracting Body: Henderson County

Amount of Bond: _____

Project **Henderson County Animal Services HVAC Replacement**

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness: _____

Contractor: (Trade or Corporate Name)

_____ By: _____

(Proprietorship or Partnership)

Attest: (Corporation) Title: _____

(Owner, Partner, or Corp. Pres. or Vice Pres. only)

By: _____

Title: _____

(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

(Surety Company)

Witness: By: _____

_____ Title: _____

(Attorney in Fact)

Countersigned:

_____ (Surety Corporate Seal)

_____

(N.C. Licensed Resident Agent)

_____

_____

Name and Address-Surety Agency

_____

_____

Surety Company Name and N.C.

Regional or Branch Office Address

Identification of HUB Certified/ Minority Business Participation

I,_____

_,

(Name of Bidder)

do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	*Minority	**HUB	Work Type Category	Certified (Y/N)

*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.**

The total value of minority business contracting will be ($)_____.

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:_____

_____

SEAL

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)

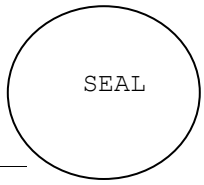
In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

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**)

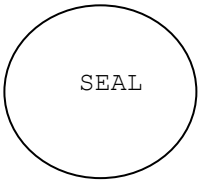
**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

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.

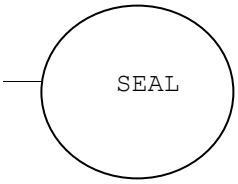
Date:_____ Name of Authorized Officer:_____

_____

Signature:_____

_____

Title:_____



State of _____, County of _____

_____

Subscribed and sworn to before me this _____day of _____

_____20____

Notary Public_____

My commission expires _____

Contract Addendum

Henderson County Terms and Conditions

A. PUBLIC RECORDS.

The seller acknowledges that notwithstanding any other provision to the contrary (including any statements regarding confidential information), this agreement, the confidential information and any documents, memorandum, data, reports, analyses, compilations, records, pricing and evaluation of all or any portion of the transactions contemplated by this agreement may be deemed public records and subject to disclosure, in whole or in part, pursuant to the North Carolina Public Records Law. The County will provide the seller with reasonably prompt notice of any intended disclosures or requests for disclosure pursuant to the North Carolina Public Records Law. The seller may then choose to seek judicial protection of the confidential information consistent with all applicable laws and regulations. Should a public records request be made for information the seller claims is proprietary in nature, the County will, within a reasonable time, notify the seller of such public records request. The seller shall, within five (5) business days of said notification, provide notice to the County that it does or does not object to the County disclosing the requested information pursuant to the subject public records request. If the seller objects to the disclosure of the requested information, the seller agrees that it shall be solely responsible for the defense of and the cost of defending any claim or complaint against the County for its refusal to disclose confidential information. The seller agrees that if any such complaint or claim is filed it will indemnify the County and will reimburse the County for any and all damages awarded against the County its refusal to disclose the requested information. The seller agrees that it releases the County from all loss, liability, claims or expense, including attorney's fees, arising out of or related to the release or disclosure or failure by the County to release or disclose confidential information. The seller further agrees that it waives the right to file any court action for any such release, disclosure, or failure to release or disclose confidential information.

B. Choice of Law

All terms and conditions shall be interpreted in accordance with the laws of the State of North Carolina. Any legal actions arising from default of this contract shall be brought only in the County of Henderson, State of North Carolina.

C. E-Verification

North Carolina General Statute §143-133.3 prohibits the County from entering into contracts with contractors and subcontractors who have not complied with the requirement of Article 2 of Chapter 64 of the North Carolina General Statutes. Contactor shall comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes. Further, if contractor utilizes a subcontractor, contractor shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the North Carolina General Statutes.

D. Payment Terms

Contractor/bidder agrees to Net 30 payment terms. The contractor/bidder shall not charge late charges or finance charges for any reason. The contractor/bidder agrees to waive any deposits required. Invoices are payable in U.S. funds.

E. Performance

All services/work rendered under this agreement will be performed at the Seller's own risk and the Seller expressly agrees to indemnify and hold harmless the County, its officers, agents, and employees from any and all liability, loss or damage that they may suffer as a result of claims, demands, actions, damages or injuries of any kind or nature whatsoever by or to any and all persons or property.

F. Cancellation

The County reserves the right to cancel this contract, or any part thereof, at any time without penalty. Such cancellation may be based upon failure of the seller to comply with the terms and conditions of this transaction, failure to perform the work with promptness and diligence, failure to make shipment within the time specified or for any other reason which causes the seller not to perform as agreed. Should the contract be canceled, vendor shall be entitled to payment for all work performed up to the date of cancellation.

G. Insurance

Contractor/Bidder shall provide an Insurance Certificate naming Henderson County as **additionally insured** per the attached certificate of insurance. Should different insurance limits be established between the vendor and the County, the Certificate of Insurance with Henderson County named as additional insured shall be contained herein.

Required Coverage	Minimum Insurance Limits
Workers' Compensation	Statutory/Employers Liability: $500,000/$500,000/$500,000
General Liability	$1M per occurrence/$2M aggregate
Automobile	$1M per occurrence/Combined Single Limit

H. Non-Appropriation

No provision of any agreement between the County and the seller (the "Agreement") shall be construed or interpreted as creating a pledge of the faith and credit of the County within the meaning of any Constitutional debt limitation. No provision of the Agreement shall be construed or interpreted as creating a delegation of governmental powers nor as a donation by or a lending of the credit of the County within the meaning of the Constitution of North Carolina. The Agreement shall not directly or contingently obligate the County to make any payments beyond those appropriated in the sole discretion of the County for any fiscal year in which the Agreement is in effect; provided, however, that any failure or refusal by the County to appropriate funds which results in the failure by the County to make any payment coming due under the Agreement will in no way obviate the occurrence of the event of default resulting from such nonpayment. No deficiency judgment may be rendered against the County in any action for breach of a contractual obligation under this Agreement, and the taxing power of the County is not and may not be pledged directly or indirectly or contingently to secure any moneys due under this Agreement. No provision of the Agreement shall be construed to pledge or create a lien of any class or source of the County's moneys, nor shall any provision of the Agreement restrict the future issuance of any of the County's bonds or obligations payable from any class or source of the County's moneys. To the extent of any conflict this provision and any other provision of the Agreement, this provision shall take priority and control.

COMPANY NAME by signature below agrees to comply with the Terms & Conditions above as it relates to *PROJECT DESCRIPTION* in the amount of $*AMOUNT* per proposal dated *DATE*. The terms and conditions of this addendum shall control and in the event of any conflict or inconsistency between the terms, the Henderson County Terms and Conditions shall govern.

IN WITNESS THEREOF, the parties have signed on _____, 2023

COMPANY NAME:

Signature: _____

Name: _____

Title _____

Henderson County:

Signature: _____

Name: _____

Title _____