PROJECT MANUAL

Northern Middle School Alterations

Person County Schools
Roxboro, North Carolina

SMITH SINNETT ARCHITECTURE

PROJECT NO. 2017020
DATE: 05 JULY 2015

Owner
Person County Schools
304 South Morgan Street
Roxboro, NC 27573

Architect
Smith Sinnett Architecture, P.A.
4600 Lake Boone Trail, Suite 205
Raleigh, North Carolina 27607

Mechanical and Electrical Engineers
Progressive Design Collaborative
3101 Poplarwood Court Suite 320
Raleigh, North Carolina 27604

BID SET

SECTION 00 01 10 - TABLE OF CONTENTS

PROJECT: Northern Middle School Alterations
Person County Schools
1935 Carver Drive
Roxboro NC 27574

END OF SECTION 00 01 10

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

FOR

Northern Middle School Alterations

1935 Carver Drive Roxboro, NC 27574

SCOPE OF WORK

The scope of work will provide alterations to the 600 and 700 classroom wings. This includes demolition and new floor, wall and ceiling finishes. The work also includes the removal of existing hollow metal door frames at the building commons area and exterior waterproofing at the gymnasium wall.

NOTICE TO BIDDERS

Bid Proposals for this work may be received electronically by email or delivered to the following address:

Scott McConnell-Project Architect
Email: smcconnell@smithsinnett.com

Delivery: Attn: Scott McConnell
The Office of Smith Sinnett Architecture
4600 Lake Boone Trail Suite 205
Raleigh, NC 27607
Tel: 919-781-8582, Cell: 919-810-8922

up to **3:00 PM**, on ***(Wednesday July 12th, 2015).*** Complete plans and specification and contract documents can be obtained from

Smith Sinnett Architecture, P.A.
4600 Lake Boone Trail, Suite 205
Raleigh, North Carolina 27607
Telephone: 919-781-8582
Fax: 919-781-3979

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

A bid bond, performance bond, and payment bond is not required for this project.

No bid may be withdrawn after the opening of bids for a period of **72** hours. The Owner reserves the right to reject any or all bids and waive informalities. Bids shall be made only on the BID/ACEPTANCE form provided herein with all blank spaces for bids properly filled in and all signatures properly executed.

Owner Representative:

Larry King, Director of Environmental Services

Person County Schools

304 Morgan Street

Roxboro, NC 27573

Telephone: 336-599-2191

Cell: 336-504-2605

Email: kingl@person.k12.nc.us

Architect Representative:

Patrick Scott McConnell, Architect

Smith Sinnett Architecture, P.A.

4600 Lake Boone Trail, Suite 205

Raleigh, North Carolina, 27607

Telephone: 919-781-8582

Cell: 919-810-8922

Email: smcconnell@smithsinnett.com

BID/ACCEPTANCE FORM

for

Northern Middle School Alterations

SSA# 2017020

Alterations to the 600 & 700 classroom wings at Northern Middle School located at 1935 Carver Street in Roxboro NC.

We are in receipt of Addendum _____1_____2

The undersigned, as bidder, proposes and agrees if this bid is accepted to contract with Person County Schools for the furnishing of all materials, equipment, and labor necessary to complete the construction of the work described in these documents in full and complete accordance with plans, specifications, and contract documents, and to the full and entire satisfaction of Person County Schools for the sum of:

BASE BID: Dollars $

Alternate #	Add/Deduct	Alternate bid price	Accepted (*OWNER INITIALS ON EACH LINE INDICATES ACCEPTANCE OF ALTERNATE*)
1 - Gymnasium Wall Waterproofing			
2 - Commons Area Door Removal			

UNIT PRICES

Unit Price No. UP/A-1; Repair of return air plenum ceiling 2' x 4' board unit cost: Dollars $_____

ALLOWANCES

Contractor to Acknowledge Allowances have been included within the Base Bid:

Allowance No. UP/A-1: Replace 2' x 4' Return Air Plenum Board- Qty (20) Acknowledge_____

Allowance No. A-2: General Contingency $25,000.00 Acknowledge_____

Allowance No. A-3: Door Hardware Allowance $20,000.00 Acknowledge_____

Respectively submitted this day of_____20____

_____

(Contractor's Name)

Federal ID#:_____ By:_____

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

_____ Address:_____
(Proprietorship or Partnership)

Attest: *(corporation)* Email Address:_____

(***Corporate Seal****)*

By:_____ License #:_____

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

G E N E R A L C O N D I T I O N S

1. GENERAL

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

2. DEFINITIONS

Owner: "Owner" shall mean, Person County Schools

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

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

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

INTENT AND EXECUTION OF DOCUMENTS

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

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

4. AS-BUILT MARKED-UP CONSTRUCTION DOCUMENTS

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

5. SUBMITTAL DATA

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

6. SUBSTITUTIONS

In accordance with the provisions of G.S. 133-3, material, product, or equipment substitutions proposed by the bidders to those specified herein can only be considered during the bidding phase until five (2) days prior to the receipt of bids or by the date specified in the pre bid conference, when submitted to the Designer with sufficient data to confirm material, product, or equipment equality. Proposed substitutions submitted after this time will be considered only as potential change order.

Submittals for proposed substitutions shall include the following information:

a. Name, address, and telephone number of manufacturer and supplier as appropriate.

b. Trade name, model or catalog designation.

c. Product data including performance and test data, reference standards, and technical descriptions of material, product, or equipment. Include color samples and samples of available finishes as appropriate.

d. Detailed comparison with specified products including performance capabilities, warranties, and test results.

e. Other pertinent data including data requested by the Designer to confirm product equality.

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

7. WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

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

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

8. MATERIALS, EQUIPMENT, EMPLOYEES

a. The contractor shall, unless otherwise specified, supply and pay for all labor, transportation, materials, tools, apparatus, lights, power, fuel, heat, water, scaffolding and incidentals necessary for the completion of his work, and shall install, maintain and remove all equipment of the construction, other utensils or things, and be responsible for the safe, proper and lawful construction, maintenance and use of same, and shall construct in the best and most workmanlike manner, a complete job and everything incidental thereto, as shown on the plans, stated in the specifications, or reasonably implied therefrom, all in accordance with the contract documents.

b. All materials shall be new and of quality specified, except where reclaimed material is authorized herein and approved for use. Workmanship shall at all times be of a grade accepted as the best practice of the particular trade involved, and as stipulated in written standards of recognized organizations or institutes of the respective trades except as exceeded or qualified by the specifications.

c. Upon notice, the contractor shall furnish evidence as to quality of materials.

d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. However, the contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth

and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request forsubstitution of materials, items, or equipment shall be submitted to the designerfor approval or disapproval; the designer prior to the opening of bids shall make such approval or disapproval. Alternate materials may be requested after the award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and owner approves.

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

f. If at any time during the construction and completion of the work covered by these contract documents, the language, conduct, or attire of any workman of the various crafts be adjudged a nuisance to the owner or designer, or if any workman be considered detrimental to the work, the contractor shall order such parties removed immediately from grounds.

g. The Contractor shall cooperate with the designer and the owner in coordinating construction activities.

h. The Contractor shall maintain qualified personnel and effective supervision at the site at all times during the project, and exercise the appropriate quality control program to ensure compliance with the project drawings and specifications. The designer is responsible for determining compliance with the drawings and specifications.

9. CODES, PERMITS AND INSPECTIONS

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

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

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

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

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

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

a. The contractors shall be jointly responsible for the entire site and the building or construction of the same and provide all the necessary protections, as required by the owner or designer, and by laws or ordinances governing such conditions. They shall be responsible for any damage to the owner's property or of that of others on the job, by them, their personnel, or their subcontractors, and shall make good such damages. They shall be responsible for and pay for any damages caused to the owner. All contractors shall have access to the project at all times, except as indicated in the Supplemental General Conditions.

b. The contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other

materials necessary to protect all the work on the building, whether set by him, or any of the subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the owner.

c. No fires of any kind will be allowed inside or around the operations during the course of construction without special permission from the designer and owner.

d. The contractor shall protect all trees and shrubs designated to remain in the vicinity of the operations by building substantial boxes around it. He shall barricade all walks, roads, etc., as directed by the designer to keep the public away from the construction. All trenches, excavations or other hazards in the vicinity of the work shall be well barricaded and properly lighted at night.

e. The contractor shall provide all necessary safety measures for the protection of all persons on the job, including the requirements of the A.G.C. *Accident Prevention Manual in Construction*, as amended, and shall fully comply with all state laws or regulations and North Carolina State Building Code requirements to prevent accident or injury to persons on or about the location of the work. He shall clearly mark or post signs warning of hazards existing, and shall barricade excavations, elevator shafts, stairwells and similar hazards. He shall protect against damage or injury resulting from falling materials and he shall maintain all protective devices and signs throughout the progress of the work.

f. The contractor shall adhere to the rules, regulations and interpretations of the North Carolina Department of Labor relating to Occupational Safety and Health Standards for the Construction Industry (Title 29, Code of Federal Regulations, Part 1926, published in Volume 39, Number 122, Part II, June 24, 1974, *Federal Register*), and revisions thereto as adopted by General Statutes of North Carolina 95-126 through 155.

i. In the event of emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the contractor is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage. Any compensation claimed by the contractor on account of such action shall be determined as provided for under Article 13(b).

j. Any and all costs associated with correcting damage caused to adjacent properties of the construction site or staging area shall be borne by the contractor. These costs shall include but not be limited to flooding, mud, sand, stone, debris, and discharging of waste products.

11. SUBCONTRACTS AND SUBCONTRACTORS

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

12. CONTRACTOR-SUBCONTRACTOR RELATIONSHIPS

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

13. CHANGES IN THE WORK AND CLAMS FOR EXTRA COST

a. The owner may have changes made in the work covered by the contract. These changes will not invalidate and will not relieve or release the contractor from any guarantee given by him pertinent to the contract provisions. These changes will not affect the validity of the guarantee bond and will not relieve the surety or sureties of said bond. All extra work shall be executed under conditions of the original contract.

b. Except in an emergency endangering life or property, no change shall be made by the contractor except upon receipt of approvedchange order from the designer, countersigned by the owner

authorizing such change. No claim for adjustments of the contract price shall be valid unless this procedure is followed. Should a claim for extra compensation by the contractor be denied by the designer or the owner, the contractor may pursue his claim in accordance with G.S. 143-135.3.

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

c. In determining the values of changes, either additive or deductive, contractors are restricted to the use of the following methods:

1. Where the extra work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, Owner the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except is such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c (2) herein. If neither party elects to proceed under c (2), then unit prices shall apply.

2. The contracting parties shall negotiate and agree upon the equitable value of the change prior to issuance of the change order, and the change order shall stipulate the corresponding lump sum adjustment to the contract price.

d. Under Paragraph “b”andMethods "c(2)" above, the allowances for overhead and profit combined shall be as follows: all contractors (the single contracting entity (prime), his subcontractors(1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc.) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1st tier, 2nd tier, 3rd tier, etc. contractors shall be allowed a maximum of 2.5% on the contracted work of their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b)above, the contractor shall include no less than fivepercent (5%***)*** profit, but no allowances for overhead.

e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:

1. The actual costs of materials and supplies incorporated or consumed as part of the work;

2. The actual costs of labor expended on the project site; labor expended in coordination, change ordernegotiation, record document maintenance, shop drawing revision or other tasksnecessary to the administration of the project are considered overhead whether they take place in an office or on the project site.

3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker’s compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed thirty percent (30%) of the actual costs of labor;

4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the work;

5. The actual costs of premiums for bonds (if applicable), insurance, permit fees and sales or use taxes related to the work.

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

f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods. All change orders shall be supported by a unit cost breakdown showing method of arriving at net cost as defined above.

g. Change orders shall be submitted by the contractor in writing to the owner/designer for review and approval. The contractor will provide such proposal and supportingdata in suitable format. The designer shallverify correctness. Delay in the processing of the change order due to lack of proper submittal by the contractor of all required supporting data shall not constitute grounds for a time extension or basis of a claim. Within fourteen (14) days after receipt of the contractor's accepted proposal including all supporting documentation required by the designer**,** the designer shall prepare the change order and forward to the contractor for his signature or otherwise respond, in writing, to the contractor's proposal. Within seven (7) days after receipt of the change order executedby the contractor, the designer shall, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. The owner shall execute the change order**,** within seven (7) days of receipt.

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

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

h. A change order, when issued, shall be full compensation, or credit, for the work included, omitted or substituted. It shall show on its face the adjustment in time for completion of the project as a result of the change in the work.

i. If, during the progress of the work, the owner requests a change order and the contractor's terms are unacceptable, the owner**,** may require the contractor to perform such work on a time and material basis whereupon the contractor shall proceed and keep accurately on such form as specified by the Designer or owner, a correct account of cost together with all proper invoices, payrolls and supporting data. Upon completion of the work a change order will be prepared with allowances for overhead and profit per paragraph d. above and "net cost" and "cost" per paragraph e. above. Without prejudice, nothing inthis paragraph shall preclude the owner from performingor tohave performed that portion of the work requested in the change order.

14. ANNULMENT OF CONTRACT

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

15. TERMINATION FOR CONVENIENCE

a. Owner may at any time and for any reason terminate Contractor's services and work at Owner's convenience, after notification to the contractor in writing via certified mail. Upon receipt of such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.

b. Upon such termination, Contractor shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, (2) such other costs actually incurred by Contractor as approved by Owner; (3) plus ten percent (10%) of the cost of the balance of the work to be completed for overhead and profit. There shall be deducted from such sums as provided in this subparagraph the amount of any payments made to Contractor prior to the date of the termination of this Agreement. Contractor shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment.

16. OWNER'S RIGHT TO DO WORK

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

17. REQUESTS FOR PAYMENT

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

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

Retainage:

a. Retainage withheld will not exceed 5% at any time.
b. The same terms apply to general contractor and subcontractors alike.

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

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

18. PAYMENTS WITHHELD

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

a. Faulty work not corrected.

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

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

d. The secretary of the Department of Administration may authorize the withholding of payment forthe following reasons:

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

ii. Evidence that subcontractors have not been paid.

When grounds for withholding payments have been removed, payment will be released. Delay of payment due the contractor without cause will make owner liable for payment of interest to the contractor as provided in G.S. 143-134.**1.**As provided in G.S. 143-134.1(e), the owner shall not be liable for interest on payments withheld by the owner for unsatisfactory job progress, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

19. MINIMUM INSURANCE REQUIREMENTS

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

a. **Worker'sCompensation and Employer's Liability**

The contractor shall provide and maintain, until final acceptance, workmen's compensation insurance, as required by law, as well as employer's liability coverage with minimum limits of $100,000.

b. **Public Liability and Property Damage**

The contractor shall provide and maintain, until final acceptance, comprehensive general liability insurance, including coverage for premises operations, independent contractors, completed operations, products and contractual exposures, as shall protect such contractors from claims arising out of any bodily injury, including accidental death, as well as from claims for property damages which may arise from operations under this contract, whether such operations be by the contractor or by any subcontractor, or by anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

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

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

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

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

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

d. **Deductible**

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

e. **Other Insurance**

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

f. **Proof of Carriage**

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

20. ASSIGNMENT

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

21. CLEANING UP AND RESTORATION OF SITE

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

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

22. GUARANTEE

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

Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The

contractor shall replace such defective equipment or materials, without cost to the owner, within the manufacturer's warranty period.

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

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

23. Not Used

24. TAXES

a. Federal excise taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3442(3)).

b. Federal transportation taxes do not apply to materials entering into state work (Internal Revenue Code, Section 3475(b) as amended).

c. North Carolina sales tax and use tax, as required by law, do apply to materials entering into state work and such costs shall be included in the bid proposal and contract sum.

d. Local option sales and use taxes, as required by law, do apply to materials entering into state work as applicable and such costs shall be included in the bid proposal and contract sum.

e. **Accounting Procedures for Refund of County Sales & Use Tax**

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

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

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

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

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

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

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

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

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

25. EQUAL OPPORTUNITY CLAUSE

The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to equal employment opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the secretary of Labor, are incorporated herein.

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

26. MINORITY BUSINESS PARTICIPATION

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

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

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

27. ACCESS TO PERSONS AND RECORDS

The State Auditor shall have access to persons and records as a result of all contracts or grants entered into by the Owner in accordance with General Statute 147-64.7. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or relating to Contractor's requests for payment, requests for change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for lost efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

28. GOVERNING LAWS

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

SUPPLEMENTARY GENERAL CONDITIONS

TIME OF COMPLETION

The Contractor shall commence work to be performed under this Contract on a date to be specified in written order from the Designer/Owner and shall fully complete all work hereunder within **32** consecutive calendar days from the Notice to Proceed.For each day in excess of the above number of days, the Contractor shall pay the Owner the amount of **Five Hundred** Dollars **($500.00)** as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner should the Contractor fail to complete the Work within the time specified.

If the Contractor is delayed at anytime in the progress of his work by any act or negligence of the Owner, his employees or his separate contractor, by changes ordered in the work; by abnormal weather conditions; by any causes beyond the Contractor's control or by other causes deemed justifiable by Owner, then the contract time may be reasonably extended in a written order from the Owner upon written request from the contractor within ten days following the cause for delay. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents.

PAYMENTS

The contractor may provide up to 3 payment request as follows with schedule of values and sales tax and MBE information attached. Payment at 50%, 95% substantial Completion and 100% Final Completion.

UTILITIES

Owner shall provide power and water utilities. Contractor shall be responsible for all connections and extensions. Use of existing toilets is permitted when school is not in session.

SECURITY

Access to other areas of the building shall be prevented without prior coordination with the Owner.

USE OF SITE

Use of site is limited to areas of construction operations only. Access to other areas of the building shall be coordinated with the Owner. Refer to Specification Section 011000 for additional Use of Site Requirements. Owner shall coordinate with Contractor at the preconstruction meeting for construction parking.

NO SMOKING POLICY

Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

MINORITY BUSINESS PARTICIPATION

Refer to attached “Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts”.

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 #	Work Type	*Minority Category	**HUB 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 ($)_____.

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

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 _____

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

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: _____

SEAL

State of _____, County of _____

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

Notary Public _____

My commission expires _____

Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid Attach to Bid

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:_____

SEAL

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:_____

SEAL

State of _____, County of _____

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

Notary Public_____

My commission expires _____

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
   2. The Contractor shall include in the Contract Sum all allowances states in the Contract Documents. The Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Sum and not in the allowance. Coordinate allowance work with related work to ensure that each selection in completely integrated and interfaced with related work. Include all allowance amounts as a separate line item amount on each application for payment.

B. Types of allowances include the following:
   1. Unit-cost allowances.
   2. Quantity allowances.

C. Related Sections include the following:
   1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
   2. Division 01 Section "Unit Prices" for procedures for using unit prices as bases to establish allowance value.

1.3 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 ALLOWANCES

A. Refer to Schedule of Allowances for Amounts and Quantities

B. Unit-Cost Allowances
   1. Each change order amount for unit-cost type allowances shall be based solely on the difference between the actual unit purchase amount and the unit allowance, multiplied by the final measure or count of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins.
   2. Include installation costs in the purchase amount only where indicated as a part of the allowance. When requested, prepare explanations and documentation to substantiate the margins as claimed. Prepare and submit substantiation of a change in the scope of work (if any) claimed in the change orders related to unit-cost type allowances. The Owner reserves the right to establish the actual quantity of work- in-place by an independent quantity survey, measure or count.
   3. Unit-Cost Allowances shall be based on the Unit Price value established.

C. Contingency Allowances
   1. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
   2. Contractor's related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
   3. Allowances for overhead and profit shall be provided within the contract price and not included as part of any change order till the allowance amount has been spent.

1.6 CHANGE ORDER MARK-UP

A. Except as otherwise indicated, comply with provisions of General Conditions and other requirements stated in this section. For each allowance, Contractor's claims for increased costs (for either purchase order amount or Contractor's handling, labor, installation, overhead, and profit), because of a change in scope or nature of the allowance work as described in contract documents, must be submitted within 60 days of initial change order authorizing work to proceed on that allowance; otherwise, such claims will be rejected.

B. As a procedural restriction no mark-up (increase or decrease) shall be included in the change order amount for Contractor's increase or decrease in handling, labor, installation, overhead or profit unless purchase order amount varies from allowance.

C. Change orders prepared to return unused allowance amounts to the Owner shall be subject to the same requirements for the return of appropriate profit and overhead as other change orders in accordance with the Conditions of the Contract. Where the Contractor has been directed not to include his related costs (profit and overhead) in the Contract Sum for contingency allowances, the return of profit and overhead shall not be excepted.

1.7 UNUSED MATERIALS

A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
   1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

SCHEDULE OF ALLOWANCES

B. **Allowance No. UP/A-1;** :
1. Allow an amount in the contract to include all materials and labor for the installation and replacement of 2' x 4' return air plenum board. **Quantity: 20**

C. **Allowance No. A-2;** GENERAL CONTINGENCY:
1. Contingency allowance shall be provided as follows and the price shall be adjusted based on the actual cost of subcontracts, materials, and labor, excluding overhead and profit. **Contingency: $25,000.00**

D. **Allowance No. A-3;** Door Hardware Allowance:
1. Allow a lump sum amount in the contract of purchasing and installation of new door hardware **Door Hardware Allowance: $20,000.00**

END OF SECTION 01 21 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices and effects all prime Contracts.

B. Related Sections include the following:
1. First Division 01 Section below contains requirements that relate directly to unit prices.
2. Division 01 Section "Allowances" for procedures to adjust quantity allowances and quantities of Unit Prices to be included in the Base Bid.

1.3 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased. Unit Prices shall be used to calculate Allowance values.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. **Unit Price No. UP/A-1;** 2' X 4' Return Air Plenum Board:
1. Provide unit price per 2' x 4' board unit to include all material and labor for installing and replacing 2' x 4' Return Air Plenum boards.

END OF SECTION 01 22 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
   1. The cost or credit for each alternate is the net addition to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

B. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

C. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

D. Execute accepted alternates under the same conditions as other work of the Contract.

E. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. **Alternate No. 1; Gymnasium Wall Waterproofing System:** State the amount to be added to the Base Bid for providing all labor and materials indicated and required to accomplish Work as shown in the construction drawings.

B. **Alternate No. 2; Commons Area Door Removal:** State the amount to be added to the Base Bid for providing all labor and materials indicated and required to accomplish Work as shown in the construction drawings.

END OF SECTION 01 23 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:
1. Division 02 Section "Selective Structure Demolition" for demolition of selected portions of the building.
2. Divisions 2 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 RESPONSIBILITIES

A. General: The Contractors shall recognize that cutting and patching work is historically and typically difficult to coordinate. The Contractors shall cooperate with each other and the Architect in coordinating the cutting and patching work on this project to overcome these historical and typical problems.

B. Cutting and patching of completed new construction required due to out of sequence construction and/or improper coordination is the responsibility of the Contractor responsible for the out of sequence construction or improper coordination. Cutting and patching of new construction for these purposes shall be accomplished by the Contractor for General Work and shall be paid for by the Contractor responsible.

C. Contractor for General Work shall cooperate with Architect and other Contractors to accomplish this cutting and patching with minimal disruption to construction.

1.5 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.

2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.6 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to:
1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include but are not limited to the following:
1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.
6. Noise- and vibration-control elements and systems.

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

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.7 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

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

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

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
   2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
   3. Concrete or Masonry**:** Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
   4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
   5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
   6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
   1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
   2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
      a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      b. Restore damaged pipe covering to its original condition.
   3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
   4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
   5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Warranties.
   3. Final cleaning.

B. Related Sections include the following:
   1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
   2. Division 01 Section "Execution" for progress cleaning of Project site.
   3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
   4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBMITTALS

A. All closeout submittals, including but not limited to, Maintenance and Operation Manual, Warranties, Bonds, additional closeout submittals required by the Owner or Architect and additional requirements stated in the specifications shall be submitted in the following way:
   1. Bind all closeout documents in one uniform color, heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate all contents in 75% of the binder's width and allow of 25% free space for future items, and sized to receive 8-1/2-by-11-inch paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate section. Mark tab to identify the content of that section. Identify each binder on the front and spine with the typed or printed title of the Binder, Project name, and name of Contractor.

1.4 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.

3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents (marked up and signed plans and specifications), operation and maintenance manuals, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.5 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Contractor.
   e. Page number.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   2. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   3. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   5. Remove tools, construction equipment, machinery, and surplus material from Project site.
   6. Remove snow and ice to provide safe access to building.
   7. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   8. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   9. Sweep concrete floors broom clean in unoccupied spaces.
   10. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
   11. Remove labels that are not permanent.
   12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

13. Replace parts subject to unusual operating conditions.
14. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
15. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
16. Leave Project clean and ready for occupancy.

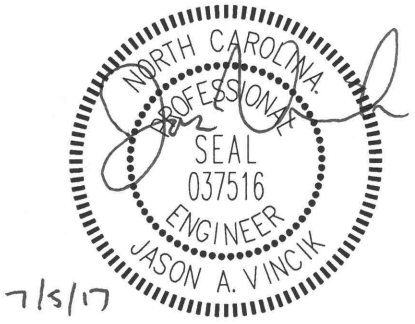
C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

INTRODUCTION TO DIVISIONS 23 – MECHANICAL

The Specification Sections applying to the Mechanical Work for Northern Middle School Alterations at Person County in Roxboro, North Carolina, are as follows:



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SECTION 23 01 00 – HVAC GENERAL PROVISIONS

A. GENERAL

1. Scope of Work

   a. The Contractor shall provide all materials, equipment and labor necessary to install and set into operation the heating and air conditioning equipment as shown on the Engineering Drawings and as contained herein.

2. Quality Assurance

   a. See the General and Supplementary General Conditions and Division 1.

   b. All work shall be in accordance with local, state and federal regulations. Minimum requirements shall be the North Carolina State Building Code.

   c. The Contractor shall be responsible for obtaining all permits and shall notify inspection departments as work progresses.

   d. Whenever the words "Approval", "Approved", or "Approved Equal" appear, it is intended that items other than the model number specified shall be subject to the approval of the engineer.

   e. All material and equipment that the Contractor proposed to substitute in lieu of those specified in the Specifications, shall be submitted to the Engineer ten (10) days prior to the bid date for evaluation. The submittal shall include a full description of the material or equipment and all pertinent engineering data required to substantiate the equality of the proposed item to that specified. Items that are submitted for approval after this date will not be accepted.

   f. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. "Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.

   g. Boiler Inspection Certificate - It shall be the responsibility of the Contractor to complete the installation of fired or unfired pressure vessels and their safety devices in accordance with the requirements of the latest edition of the North Carolina Department of Labor, "Boiler Inspection Law, Rules and Regulations".

      The Contractor shall be responsible for notifying the Bureau of Boiler Inspection in writing at least two weeks prior to the date of completion of all equipment requiring inspection. Certificates furnished by the Bureau of Boiler Inspection shall be installed in a frame having a removable glass cover and posted near the pressure vessel. Certificates shall be installed before requesting final inspection of the completed project. The pressure vessel is **NOT** to be operated before it is inspected and approved.

3. Substitutions

   a. Products are specified for use on this project by one of the following:

      1) Reference Standards and Description: Any products meeting the Reference Standards and Description will be acceptable (i.e., piping).

      2) Naming of a product as an example to denote the quality standard of the product desired, in which case three or more brands will be denoted (where applicable) to establish equivalent designs. Naming of a product does not restrict Bidders to a specific brand (i.e., fixtures, valves, etc.).

Requests for approval of manufacturer's or substitutions which have not been preapproved shall be made by using the forms at the end of this section.

b. During bidding period: Submitted written requests from Bidders Only, using the forms herein, will be considered if received ten (10) calendar days prior to the date of receipt of bids to allow for proper evaluation. Requests from suppliers or subcontractors will not be considered. Substitutions will be considered when a product becomes unavailable through no fault of the Contractor. A request constitutes a representation that the Bidder/Contractor:

1) Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product and is suitable for use in the Work.
2) Will provide the same warranty for the substitution as for the specified product.
3) Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Owner.
4) Waives claims for additional cost or time extension which may subsequently become apparent.
5) Has included a list of similar projects on which this product has been used with names and telephone numbers for verification.
6) Has written verification from the product manufacturer that this product has been in use a minimum of two (2) years on a project similar to this work.

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

c. Architect/Engineer Review

1) Review and approval will rely on manufacturer's literature and other data as outlined herein.
2) Inadequacies in such submittals that fail to identify unsuitability are the responsibility of the parties making submittal.

d. Substitution Procedure

1) Submit written request for substitution for consideration. Limit each request to one proposed substitution.
2) Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3) Submit listing of similar projects.
4) Submit manufacturer's written verification that product has been in use a minimum of two (2) years at similar projects.
5) The Architect/Engineer will notify Contractor, in writing, of decision to accept or reject request.
6) Products bid or incorporated in the work that are not specified and without written approval of the Architect/Engineer may not be acceptable, and if not, the Contractor will be required to furnish and install the products specified.
7) The Architect/Engineer will issue written approvals of product substitutions to all Bidders. Substitutions are not approved without written approval.

FORMS: Copy forms incorporated at the end of this section and use for all product substitution requests.

4. Submittals

   a. See General and Supplementary General Conditions and Division 1.

   b. Within ten days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit to the Architect/Engineer for approval a detailed list of equipment and material which he proposes to use. Items requiring submittal data for approval will be noted at this time.

   c. The Contractor shall provide an electronic pdf copy of submittal data bound in a 3-ring binder. The 3-ring binder shall contain complete submittal data on **all** products, methods, etc. proposed for use on the project.

   d. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number, and all necessary performance and fabrication data.

   e. The Contractor shall submit to the Engineer a set of accurately marked up plans indicating all changes encountered during the construction. Final payment will be contingent on receipt of these as-built plans.

   f. The Contractor shall furnish an electronic copy of maintenance and operating instructions as outlined in Paragraph C (Execution), Item #8, of this specification section.

   g. The Contractor shall submit to the Owner all certificates required for operating system in compliance with local, state and federal regulations.

5. Product Delivery, Storage and Handling

   a. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.

   b. The Contractor shall protect all material and equipment from breakage, theft, or weather damage. No material or equipment shall be stored on the ground.

   c. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.

6. Work Conditions and Coordination

   a. The Contractor shall review the electrical plans to establish points of connection and the extent of electrical work to be provided in his Contract. All electrical work shall be performed by a licensed electrical contracting firm.

   b. This Contractor shall be responsible for the final electrical connections to all equipment installed as part of his contract. Unless otherwise noted, this Contractor shall wire from his equipment to disconnect switches, junction boxes, or panelboard circuit breakers as provided by the Electrical Contractor.

   c. Electrical work shall be in accordance with all local, state and national codes and as specified in Division 26.

   d. Pipe, conduit and duct chases required for installation of work shall be provided by the General Contractor unless otherwise noted. This Contractor shall be responsible for coordinating the location of all required chases.

   e. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be at the Contractor's expense at no extra cost to the Owner.

7. Guarantee

    a. See the General and Supplementary General Conditions

    b. Where extended warranties or guarantees are available from the manufacturer, the Contractor shall prepare the necessary contract documents to validate these warranties as required by the manufacturer and present them to the Architect/Engineer.

    c. The Contractor shall include in his bid a full warranty and guarantee for a five (5) year period on the compressors for the refrigeration equipment, including all chillers. This warranty does not include labor following the first year's Labor and Material Warranty.

B. PRODUCT

1. Materials and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Materials and equipment found defective shall be removed and replaced at the Contractor's expense.

2. The Contractor shall provide name plates for identification of all equipment, switches, panels, etc. The name plates shall be laminated phenolic plastic, black front and back with white core, white engraved letters (1/4" minimum) etched into the white core. Name plates shall be fastened with sheet metal screws.

C. EXECUTION

1. Inspection

    a. This Contractor shall examine the areas of completed work and shall insure that no defects or errors are present which would result in the poor application or installation of subsequent work.

2. Installation

    a. All work shall be performed in a manner indicating proficiency in the trade.

    b. All conduit, pipes, ducts, etc. shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.

    c. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.

    d. All patching shall be done in such a manner as to restore the areas or surfaces to match existing finishes.

    e. The Contractor shall lay out and install his work in advance of pouring concrete floors or walls. He shall furnish all sleeves to the General Contractor for openings through poured masonry floors or walls, above grade, required for passage of all conduits, pipes, or ducts installed by him. The Contractor shall provide all inserts and hangers required to support his equipment.

3. Performance

    a. The Contractor shall perform all excavation and backfill operations necessary for installation of his work.

4. Erection

    a. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.

5. Field Quality Control

    a. The Contractor shall conform to the requirements of Division 3 for concrete testing.

    b. All testing required for compliance with the Contract shall be as stated in subsequent sections.

6. Adjust and Clean

    a. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.

    b. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for intended service. In no event shall name plates be painted.

    c. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract (in the presence of the Engineer).

    d. Equipment with filter media shall be run for a period of two (2) weeks after completion of work at which time a new filter media shall be installed with one change of filter media provided the Owner for future replacement. (Provide a total of three (3) sets).

    e. The Contractor shall adjust the tension on all belts six months after the final inspection.

7. Diagrams

    a. The Contractor shall provide an "As-Built" Temperature Control Diagram in framed glass mounted on the Equipment Room wall.

    b. The Contractor shall provide an "As-Built" Control wiring Diagram in framed glass mounted on the Equipment Room wall.

8. Maintenance and Operating Manual

    a. The Contractor shall prepare an electronic submission of a manual describing the proper maintenance and system operation. This manual shall not consist of standard factory printed data intended for dimension or design purposes (although these may be included), but shall be prepared to describe this particular job. This manual shall include the following:

        1) A check list for periodic maintenance of all equipment.

        2) Suggested setting of all controls and switches for normal operation, with description of control and its location.

        3) A check list for seasonal shutdown.

        4) Maintenance and spare parts data for each major piece of equipment.

        6) As-built wiring, interlock and control diagrams for equipment with color coding shown on wiring and interlock diagrams.

        7) Air and Water Balance Report.

    b. The manuals shall be dated and signed by the Contractor when completed.

    c. The operating and maintenance manuals shall be submitted to the Engineer for approval. When the manuals are considered complete by the Engineer, they will be turned over to the Owner for their permanent use.

SUBSTITUTION AND PRODUCT OPTIONS

TO: PROGRESSIVE DESIGN COLLABORATIVE, LTD.
Post Office Box 61249
Raleigh, North Carolina 27661-61249

PROJECT NAME: _____

The undersigned requests that the following product be considered for substitution in lieu of the specified item in Project Manual Section_____ Page_____ Paragraph_____ Description of Item:

_____

_____

_____

Proposed Substitution: _____

_____

The undersigned certifies that the following statements are correct, unless modified on an attachment:

1. The proposed substitution is equal or better in appearance, function and quality to the specified item, in all respects and is suitable for inclusion in the Work.
2. Attached is an electronic copy of the Manufacturers Product Description, Specifications, Data Sheets, Photographs, Test Data and Color Charts.
3. We will furnish a physical sample, if requested by the Architect/Engineer.
4. Every variation of this product is to be listed and clearly delineated on the submission.
5. This substitution will require no dimensional changes to the drawings and will have no effect on other trades, the construction schedule or warranty requirements.
6. List of similar type project in which product is used.
7. Verification from manufacturer that product has been in use a minimum of two (2) years at similar projects.

SUBSTITUTIONS AND PRODUCT OPTIONS:

MANUFACTURER OR REPRESENTATIVE
Submitted by:

Name:_____

Firm:_____

Address:_____

_____

_____

Phone No.:_____

Date:_____

Signature:_____

CONTRACTOR OR BIDDER
Submitted by:

Name:_____

Firm:_____

Address:_____

_____

_____

Phone No.:_____

Date:_____

Signature:_____

By approving and submitting shop drawings, product data and samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related hereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the work and of the Contract Documents.

The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect/Engineer's approval of shop drawings, product data or samples unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of submission and the Architect/Engineer has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's approval.

Architect's Reply:

( ) APPROVED
( ) APPROVED AS CORRECTED
( ) REVISE AND RESUBMIT
( ) NOT APPROVED

ARCHITECT:

_____

By:_____

Signature:_____

Date:_____

Engineer's Reply:

( ) APPROVED
( ) APPROVED AS CORRECTED
( ) REVISE AND RESUBMIT
( ) NOT APPROVED

ENGINEER:

PROGRESSIVE DESIGN COLLABORATIVE

By:_____

Signature:_____

Date:_____

END OF SECTION 23 01 00

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SECTION 23 05 95 – TESTING, ADJUSTING AND BALANCING – AIR ONLY

A. GENERAL

1. Related Documents

   a. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

   b. This work should be completed by an independent Balancing Contractor. The price of this work should be included in the bid.

   c. The Test and Balance Report should be completed two weeks prior to the final inspection with the Owner. The report should be submitted to the Engineer for review. A copy should be available at the final inspection and test equipment should be available at the final inspection for spot checking by the Engineer.

   d. The Test and Balance Contractor should be at the final inspection to spot check the air balance with the Engineer.

2. Summary

   a. This Section specified the requirements and procedures for total mechanical systems testing, adjusting, balancing, and recording and reporting the results.

   b. Test, adjust, and balance the following mechanical systems:

      1) Supply air systems
      2) Return air systems
      3) Exhaust air systems
      4) Verify temperature control system operation.

   c. Test systems for proper sound and vibration levels.

   d. This Section does not include:

      1) Specifications for materials for patching mechanical systems

      2) Specifications for materials and installation of adjusting and balancing, refer to the respective system sections for materials and installation requirements

      3) Requirements and procedures for ductwork systems leakage tests.

3. Definitions

   a. Systems testing, adjusting, and balancing is the process of checking and adjusting all the building environmental systems to produce the design objectives. It includes:

      1) The balance of air distribution
      2) Adjustment of total system to provide design quantities
      3) Electrical measurements
      4) Verification of performance of all equipment and automatic controls
      5) Sound and vibration measurements

   b. Test: To determine quantitative performance of equipment.

c. Adjust: To regulate the specified flow rate and air patterns at the terminal equipment (e. g., reduce fan speed, throttling).

d. Balance: To proportion flows within the distribution system (submains, branches, and terminals) according to specified design quantities.

e. Procedure: Standardized approach and execution of sequence of work operations to yield reproducible results.

f. Report forms: Test data sheets arranged for collecting test data in logical order for submission and review. These data should also form the permanent record to be used as the basis for required for future testing, adjusting, and balancing.

g. Terminal: The point where the controlled fluid enters or leaves the distribution system. These are supply outlets on air terminals and exhaust or return inlets on air terminals such as registers, grilles, diffusers, louvers, and hoods.

h. Main: Duct containing the system's major or entire fluid flow.

i. Submain: Duct containing part of the system's capacity and serving two or more main branches.

j. Branch Main: Duct serving two or more terminals.

k. Branch: Duct serving a single terminal.

4. Submittals

a. Agency Data:

1) Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

b. Engineer and Technicians Data:

1) Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified below.

c. Procedures and Agenda: Submit a synopsis of the testing, adjusting, and balancing procedures and agenda proposed to be used for this project.

d. Maintenance Data: Submit maintenance and operating data that includes how to test, adjust, and balance the building systems. Include this information in maintenance data.

e. Sample Forms: Submit sample forms, if other than those standard forms prepared by the AABC or NEBB are proposed.

f. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1) Draft Reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be hand written, but must be complete, factual, accurate and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

2) Final Report: Upon verification and approval of draft reports, prepare type written final reports. The Final Report is to be placed in and become a part of the Maintenance and Operations Manuals (4 copies).

3) Report contents: Provide the following minimum information, forms and data:

a) General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name, address telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.

b) The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by AABC or NEBB, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form.

g. Calibration Reports: Submit proof that all required instrumentation has been calibrated to tolerances specified in the referenced standards, within a period of six months prior to starting the project.

5. Quality Assurance

a. Test and Balance Engineer's Qualifications: A Professional Engineer (independent consultant), registered in the State in which the services are to be performed, and having at least 3-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

b. Agency Qualifications:

1) Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications, and recording and reporting the results.

2) An independent testing, adjusting, and balancing agency certified by Associated Air Balance Council (AABC) or National Environmental Balancing Bureau (NEBB) in those testing and balancing disciplines required for this project, and having at lest one Professional Engineer registered in the State in which the services are to be performed, certified by AABC or NEBB as a Test and Balance Engineer.

c. Codes and Standards:

1) ASBC: “National Standards for Total System Balance”.

2) ASHRAE: ASHRAE handbook, 1999 Applications Volume, Chapter 34, Testing , Adjusting, and Balancing.

d. Pre-Balancing Conference: Prior to beginning of the testing, adjusting, and balancing procedures, schedule and conduct a conference with the Engineer and representatives of installers of the mechanical systems. The objective of the conference is final coordination and verification of system operation and readiness for testing, adjusting and balancing.

6. Project Conditions

a. Systems Operation: Systems shall be fully operational prior to beginning procedures.

B. PRODUCT (Not Applicable)

C. EXECUTION

1. Preliminary procedures for Air System Balancing

a. Before operating the system, perform these steps:

1) Obtain design drawings and specifications and become thoroughly acquainted with the design intent. (By Contractor).

2) Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams. (By Contractor)

3) Compare design to installed equipment and field installations.

4) Walk the system to determine variations of installation from design.

5) Check filters for cleanliness.

6) Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.

7) Prepare report test sheets for both fans and outlets. Obtain manufacturer’s outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a cross-check with required fan volumes.

8) Determine best locations in main and branch ductwork for most accurate duct traverses.

9) Place outlet dampers in the full open position.

10) Prepare schematic diagrams of system “as-built” ductwork and piping layouts to facilitate reporting.

11) Lubricate all motors and bearings.

12) Check fan belt tension.

13) Check fan rotation.

2. Measurements:

    a. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

    b. Provide instruments meeting the specifications of the referenced standards.

    c. Use only those instruments which have the maximum field measuring accuracy and are best suited to the function being measured.

    d. Apply instrument as recommended by the manufacturer.

    e. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

    f. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

    g. Take all readings with the eye at the level of the indicated value to prevent parallax.

    h. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

    i. Take measurements in the system where best suited to the task.

3. Performing Testing, Adjusting, and Balancing:

    a. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards.

    b. Cut insulation and ductwork for installation of test probes to the minimum extent necessary to allow adequate performance of procedures.

    c. Patch insulation, ductwork, and housings, using materials identical to those removed.

    d. Seal ducts and piping, and test for and repair leaks.

    e. Seal insulation to re-establish integrity of the vapor barrier.

    f. Mark equipment settings, including damper control positions, fan speed control levers, and similar controls and devices, to show final settings. Mark with paint or other suitable, permanent identification materials.

    g. Retest, adjust, and balance systems subsequent to significant system modifications, and resubmit test results.

    h. Belts, pulleys and sheaves shall be replaced as needed, at no additional cost, to obtain the indicated quantities.

4. Testing for Sound and Vibration

    a. Test and adjust mechanical systems for sound and vibration in accordance with the detailed instructions of the referenced standards.

5. Record and Report Data

    a. Record all data obtained during testing, adjusting, and balancing in accordance with and on the forms recommended by the referenced standards, and as approved on the sample report forms.

    b. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

6. Demonstration

    a. Training

        1) Train the Owner's maintenance personnel on troubleshooting procedures and testing, adjusting, and balancing procedures. Review with the Owner's personnel, the information contained in the Operating and Maintenance Data specified in Division 1 and Section 23 01 00 - HVAC General Provisions.

        2) Schedule training with the Owner through the Engineer with at least 7 days prior notice.

END OF SECTION 23 05 95

SECTION 23 07 15 –DUCT WRAP INSULATION

A. GENERAL

1. The Contractor shall insulate all ductwork as outlined below.

2. All insulation, coverings and adhesives shall have a flame spread classification of 25 or less and a smoke developed rating of not more than 50 per ASTM E 84.

B. PRODUCT

1. Duct wrap insulation shall be used where duct is concealed from view or in mechanical rooms or other unfinished areas.

2. All supply, return, and outside air ductwork shall be completely insulated, unless otherwise noted on the plans. Insulation shall completely cover flexible duct connections.

3. Ductwork shall be wrapped on all sides with minimum nominal 3" thick fiberglass insulation with reinforced aluminum foil vapor barrier. Joints shall be wrapped with a minimum of 6" wide band of insulation to prevent any possible leakage and condensation.

4. Exhaust air ductwork does not require insulation unless otherwise indicated on the plans.

5. All insulation inside the building, except in the attic, shall have a minimum R-value of 6.0 based on installed thickness. If any insulation wrap or board is installed outside of the building or in an attic, then it shall have a minimum R-value of 8.0 based on installed thickness.

6. All insulation shall be formaldehyde free.

C. EXECUTION

1. Insulation shall be installed according to the manufacturer's recommendations.

2. Duct sizes shown on the Drawings are actual interior sheet metal dimensions. Duct insulation thickness shall be added to this dimension for final duct size.

3. Equipment and ducts in Equipment Rooms, Boiler/Pump Rooms, Mechanical Rooms and Lofts and exposed areas should be insulated with 2” thick fiberglass duct board and finished with one coat of eight ounce pasted canvas. Paint with two coats of paint.

END OF SECTION 23 07 15

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SECTION 23 31 13 – LOW PRESSURE DUCTWORK

A. GENERAL

1. This Section includes low pressure ductwork, splitter dampers, balancing dampers, air deflection devices, etc. required for a complete system.

2. The Drawings are intended to indicate, with reasonable accuracy, the location of components and the general arrangement of the system. All offsets, bends, fittings and other devices, not shown but required for the full operation of the system, shall be provided.

B. PRODUCT

1. Ductwork shall be fabricated from the best quality galvanized G90 sheet steel, unless noted otherwise on the plans.

2. All low pressure ductwork shall be constructed to 2" w.g. pressure class. All duct shall be sealed to SMACNA seal class A.

3. Splitter dampers, balancing dampers, turning vanes and air deflection devices shall be installed as shown on the plans and/or where required for the proper control of air flow.

4. Provide opposed blade configuration for volume control dampers. Provide multi-blade dampers for duct sizes larger than 18x12 per SMACNA. All balancing and control dampers shall have airfoil blades and shall be AMCA certified.

5. At all take-offs to diffusers, butterfly dampers with locking quadrant shall be installed. Provide insulation stand-offs on quadrant and spray paint damper handle for easy identification.

6. Round and rectangular ductwork shall be of gauges and construction methods as indicated in the latest ASHRAE Guide and SMACNA Standard.

7. If there are any locations where dampers will be inaccessible during balancing, then the Contractor shall provide a remote method of adjusting the damper. The remote adjustment system shall be comprised of Bowden cable controls, compatible damper, ceiling box, and a ceiling coverplate/cap to conceal controls. Coordinate location of ceiling boxes with Engineer.

C. EXECUTION

1. All elbows shall be 1-1/2W radius.

2. Branch take-off configuration shall be a tapered boot.

3. Do not use short reducers.

4. Turning vanes shall be installed in rectangular elbows for all ductwork.

5. Duct transitions, splitter dampers, and balancing dampers shall be constructed of gauges and materials as indicated in ASHRAE Guide and SMACNA Standards.

6. Hangers and supports for ductwork shall be of metal bands, angles and rods as indicated in ASHRAE Guide and SMACNA Standards. The minimum band width shall be 1", 16 gauge, galvanized steel.

7. Where located on rooftops, ducts shall be supported with hot dipped galvanized roof supports with high-density polypropylene bases. Products shall be by PHP, Miro Industries, or Caddy.

8. Where ductwork passes through floors and walls, the space around the ducts shall be sealed in an approved manner with mineral wool insulation, and/or proper fire seal material approved by the Local Inspector.

9. In exposed areas and mechanical rooms, ductwork openings shall be finished with a metal collar.

10. Ductwork shall be cross braced and reinforced properly with galvanized steel angles as recommended by SMACNA Standards.

11. Where ductwork behind grilles, diffusers, or louvers is visible, it shall be painted with two coats of flat black base fire retardant paint.

12. Duct connections to outside air louvers shall be pitched to drain outside and shall be soldered watertight.

13. Tape all joints and seams with Hardcast or approved equal for completely air tight system. Do not Hardcast when below manufacturer's recommended temperature range.

14. All ducts shall be air tight, rigid and free from vibration and noise.

15. Duct dimensions shown on the Drawings are Actual Sheet Metal Dimensions unless noted otherwise on the drawings.

12. All duct connections to and from all centrifugal fans or cabinets containing fans, shall be made with fabric equal to "Ventfab" as made by Ventfabrics, INC., not less than four inches (4") long, secured by peripheral iron straps holding fabric in formed channel iron or angles. Strap and channels shall be galvanized iron, except as otherwise noted.

13. Vertical ducts shall be supported at each floor level by means of an angle iron frame riveted to the ductwork on at least two (2) sides. Horizontal runs of ductwork shall be supported on not more than 8'-0" centers and as required.

14. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

END OF SECTION 23 31 13

SECTION 23 33 47 – FLEXIBLE DUCTWORK – LOW PRESSURE

A. GENERAL

1. This section includes low pressure flexible duct with insulation required for a complete system.

2. The drawings are intended to indicate, with reasonable accuracy, the location of components and the general arrangement of the system.

3. Flexible ducts shall be by Clevaflex, or approved equivalent by Genflex or Metalflex.

B. PRODUCT

1. Ducts shall be one-ply flexible ducts with low friction.

2. All flexible ducts shall have a factory installed minimum 2" thick fiberglass insulation with a seamless foil vapor barrier. R-value shall be minimum 6.0.

3. Length of flexible duct shall not exceed 5 feet.

4. Flexible ducts shall be UL-181 listed and comply with NFPA Standards 90A and 90B.

5. Products shall be Greenguard Gold certified and formaldehyde free.

C. EXECUTION

1. All flexible duct connections to main trunk duct and grilles or diffusers shall be made with approved fittings and shall be taped air tight.

2. All ductwork shall be installed where shown on the plans and according to the manufacturer's recommendations.

3. Flexible duct dimensions shown on the plans are Net Inside Dimensions.

6. During construction, provide temporary closure of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

END OF SECTION 23 33 47

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SECTION 23 33 53 – DUCT LINER

A. GENERAL

1. All parts of insulation system shall have a maximum flame spread index of 25 and a maximum smoke developed index of 50 per ASTM E 84.

2. Contractor shall be responsible for keeping the material clean and dry prior to installation.

B. PRODUCT

1. Duct liner shall be limited to use on transfer ducts only.

2. All transfer ducts shall be lined.

3. Duct liner shall be 2 inch thick closed cell type equivalent to Armacell AP Armaflex FS. Minimum installed R-value of 6.0.

4. UL 181, NFPA 90A and 90B, ASTM C 209.

5. Liner shall have durable, resilient coating that will prevent deterioration of liner up to 5,000 fpm and 250°F per ASTM C 1071.

6. Maximum k-value of 0.25 Btu-in/h-ft2-deg F at 75 degree F mean temperature.

7. Maximum water absorption of 0.2% by volume per ASTM C 209.

8. All insulation shall be Greenguard Gold certified and formaldehyde free.

C. EXECUTION

1. Insulation shall be installed in accordance with the manufacturer's installation instructions and SMACNA HVAC Duct Construction standards.

2. Mechanical fasteners shall be provided in accordance with NAIMA or SMACNA standards and shall not compress the liner thickness more than 10%.

3. At corners of duct, the liner shall either be folded, or lapped and buttered along the full length of the longitudinal joint.

4. Metal nosings shall be securely installed over transversely oriented liner edges facing air stream at fan discharge and at any interval of lined duct preceded by unlined duct.

5. Duct dimensions shown on the plans are inside clear dimensions.

END OF SECTION 23 33 53

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SECTION 23 37 13 – AIR DISTRIBUTION OUTLETS

A. GENERAL

1. Furnish and install air distribution devices of the type, size, and configuration indicated on the drawings.

2. Refer to Architectural Reflected Ceiling Plan and Schedule for types of ceilings specified, and provide compatible frames, borders, etc. on air distribution devices.

B. PRODUCT

1. Surface mounted air distribution devices shall have sponge gaskets.

2. Air distribution devices shall have baked on enamel finish suitable for painting if required.

3. All air distribution outlets shall be by Krueger, Carnes, Tuttle & Bailey, Price, Nailor Industries, or Metalaire.

4. All surfaces visible through air distribution devices should be painted flat black.

C. EXECUTION

1. Air distribution devices shall be mounted level, straight and flush with walls or ceilings.

2. Color shall be as indicated on drawings, or as selected by the Architect/Engineer.

3. Locations of all air distribution devices shall be coordinated with ceiling and lighting work.

END OF SECTION 23 37 13

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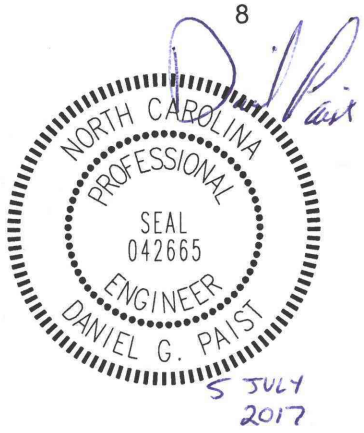
INTRODUCTION TO DIVISIONS 26 & 28 – ELECTRICAL & FIRE ALARM

The Specification Sections applying to the Electrical Work for Northern Middle School Alterations at Person County in Roxboro, North Carolina are as follows:



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SECTION 26 01 00 – ELECTRICAL GENERAL PROVISIONS

A. GENERAL

1. Scope of Work

   a. This Contractor shall provide all materials, equipment and labor necessary to install and set into operation the electrical equipment as shown on the Engineering Drawings and as contained herein.

2. Quality Assurance

   a. See the General and Supplementary General Conditions and Architectural Divisions.

   b. All work shall be in accordance with the North Carolina State Building Code, which includes the 2014 edition of the National Electrical Code.

   c. The Contractor shall be responsible for obtaining all permits and shall notify inspection departments as work progresses.

   d. Wherever the words "Approved", "Approval", and "Approved Equal" appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.

   e. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. “Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.

   f. All material and equipment that the Contractor proposes to substitute in lieu of those specified shall be submitted to the Engineer ten (10) days prior to the bid date for evaluation. The submittal shall include a full description of the material or equipment and all pertinent engineering data required to substantiate the equality of the proposed item to that specified. Items that are submitted for approval after this date will not be accepted.

   g. All personnel under this Contractor’s supervision shall be qualified to perform those portions of the work assigned to them. Personnel (including project managers) deemed to be negative to the overall success of the project shall be removed from the project and replaced with qualified personnel who will be positive for the project. Upon written notification that particular personnel have been deemed negative to the overall success of the project, this Contractor shall immediately replace such particular personnel. The engineer shall be sole arbiter and any decision regarding fitness of this Contractor’s personnel for this project shall not be subject to appeal.

3. Substitutions

   a. Products are specified for use on this project by the following:

      1) Reference Standards and Description: All products shall meet the Reference Standards and Description (i.e., conduit and conduit fittings).

      2) Naming of a product as an example to denote the quality standard of the product desired, in which case three or more brands will be denoted (where applicable) to establish equivalent designs. Naming of a product does not restrict Bidders to a specific brand (i.e., fixtures, devices, etc.).

Requests for approval of manufacturer's or substitutions which have not been pre-approved shall be made by using the forms at the end of this section.

b. During bidding period: Submitted written requests from Bidders Only, using the forms herein, will be considered if received ten (10) calendar days prior to the date of receipt of bids to allow for proper evaluation. Requests from suppliers or subcontractors will not be considered. Substitutions will be considered when a product becomes unavailable through no fault of the Contractor.

A request constitutes a representation that the Bidder/Contractor:

1) Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product and is suitable for use in the Work.
2) Will provide the same warranty for the substitution as for the specified product.
3) Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to the Owner.
4) Waives claims for additional cost or time extension which may subsequently become apparent.
5) Has included a list of similar projects on which this product has been used with names and telephone numbers for verification.
6) Has written verification from the product manufacturer that this product has been in use a minimum of two (2) years on a project similar to this work.

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

c. Architect/Engineer Review

1) Review and approval will rely on manufacturer's literature and other data as outlined herein.
2) Inadequacies in such submittals that fail to identify unsuitability are the responsibility of the parties making submittal.

d. Substitution Procedure

1) Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2) Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
3) Submit listing of similar projects.
4) Submit manufacturer's written verification that product has been in use a minimum of two (2) years at similar projects.
5) The Architect/Engineer will notify Contractor, in writing, of decision to accept or reject request.
6) Products bid or incorporated in the work that are not specified and without written approval of the Architect/Engineer may not be acceptable, and if not, the Contractor will be required to furnish and install the products specified.
7) The Architect/Engineer will issue written approvals of product substitutions to all Bidders. Substitutions are not approved without written approval.

4. Submittals

a. See General and Supplementary General Conditions and Division 1.

b. Within ten (10) days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit for approval to the Architect/Engineer a detailed list of equipment and material which he proposes to use.

c. The Contractor shall provide six (6) sets of submittal data bound in a 3-ring binder. The 3-ring binder shall contain complete submittal data on **all** products, methods, etc. proposed for use on the project. Permission shall be obtained from the Engineer to submit data outside of the 3-ring binder, such as submittal data requiring early review for special ordering purposes.

d. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number and all necessary performance and fabrication data. Detailed submittal data shall be provided when items are to be considered as substitution for specified items. Acceptance for approval shall be in writing from the Engineer.

e. The Contractor shall submit to the Engineer a set of accurately marked-up plans indicating all changes encountered during the construction. Final payment will be contingent on receipt of these as-built plans.

f. The Contractor shall furnish four (4) bound sets of maintenance and operating instructions.

g. The Contractor shall submit to the Engineer a duplicate set of final electrical inspection certificates prior to final payment.

5. Product Delivery, Storage and Handling

a. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.

b. The Contractor shall protect all material and equipment from breakage, theft or weather damage. No material or equipment shall be stored on the ground.

c. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.

6. Work Conditions and Coordination

a. The Contractor shall review the entire set of plans to establish points of connection and the extent of electrical work to be provided in his Contract.

b. This Contractor shall be responsible for all electrical work and make final connections to equipment installed in his Contract.

c. Pipe, conduit and duct chases required for installation of work shall be provided by the General Contractor unless otherwise noted. This Contractor shall be responsible for coordinating the location of all required chases.

d. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be approved by Architect/ Engineer and shall be at the Contractor's expense with no extra cost to the Owner.

7. Guarantee

a. See the General and Supplementary General Conditions.

b. Where extended warranties or guarantees are available from the manufacturer, the Contractor shall prepare the necessary Contract Documents to validate these warranties as required by the manufacturer and present them to the Architect/Engineer.

B. PRODUCT

1. Material and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Material and equipment found defective shall be removed and replaced at the Contractor's expense.

2. The Contractor shall 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 at least equipment name, controlled, served by, phase, voltage, ampacity, KVA, and KW. Nameplates shall be securely attached to equipment with self-tapping cadmium plated screws, and shall identify equipment controlled, attached, etc. Letter 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.
   -Black surface with white core for 277/480 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.

3. 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.

4. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface scheme outlined above. This includes covers on boxes above lift-out and other type accessible ceilings.

5. All materials and equipment shall comply with the Underwriters' Laboratories, Inc. standards or have UL approval, or bear UL re-examination listing where such approval has been established for the type of device in question.

C. EXECUTION

1. Inspection

   a. If any part of this Contractor's work is dependent for its proper execution or for its subsequent efficiency or appearance on the character or conditions of contiguous work not executed by him, the Contractor shall examine and measure such contiguous work and report to the Architect or Engineer in writing any imperfection therein, or conditions that render it unsuitable for the reception of this work. Should the Contractor proceed without making such written report, he shall be held to have accepted such work and the existing conditions and he shall be responsible for any defects in this work consequent hereon and will not be relieved of the obligation of any guarantee because of any such imperfection or condition.

2. Installation

   a. All work shall be performed in a manner indicating proficiency in the trade.

b. All conduit, pipes, ducts, etc., shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.

c. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.

d. All patching shall be done in such a manner as to restore the areas or surfaces to match existing finishes.

e. The Contractor shall lay-out and install his work in advance of pouring concrete floors or walls. He shall furnish and install all sleeves or openings through poured masonry floors or walls above grade required for passage of all conduits, pipes or duct installed by him. The Contractor shall furnish and install all inserts and hangers required to support his equipment.

f. Grounding

1) All grounding shall be in accordance with the requirements of the NEC. The main secondary service ground from transformer service entrance and from generator service entrances shall be bare copper wire in conduit to water main at point where water main enters the building and connected using heavy duty brass clamp type connector. Bond ground wire to conduit at each end. Bond system neutral bus to equipment grounding bus sized per table 250-66 of the NEC.

2) Extend ground conductors in conduit from grounding bus of each motor control center to main switchboard, bond to equipment grounding bus of main switchboard at this point.

3) The secondary neutral of each dry type transformer shall be bonded to the conduit system and to transformer case and a ground wire extended to the nearest grounding electrode, per the NEC.

4) Install a #12 TW green grounding jumper from the ground terminal of each receptacle to a sheet metal screw on the outlet box.

5) Install ground wire in all flexible connections (flex shall not be acceptable for grounding purposes), and in all wiremold.

3. Performance

a. The Contractor shall perform all excavation and backfill operations necessary for installation of his work.

4. Erection

a. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.

5. Field Quality Control

a. The Contractor shall conform to the requirements of Division 3 for concrete testing.

b. The Contractor shall test his entire installation and shall furnish the labor and materials required for these tests. Tests shall be performed in accordance with the requirements of the particular section of the specifications and in accordance with the requirements of the State Ordinances and Codes, and the National Electrical Code. The Contractor shall notify the Architect or Engineer of his readiness for such test. A final inspection by the Electrical Inspector or Local Authority Having Jurisdiction is required, and an inspection certificate is required prior to authorization of final payment.

c. Testing required for compliance with the Contract shall be stated in subsequent sections.

6. Adjust and Clean

   a. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.

   b. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for the intended service. In no event shall nameplates be painted.

   c. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract (in the presence of the Engineer).

   d. The Contractor shall provide to the Owner, at no additional cost, a video recording (DVD format) of all training sessions held to train the Owner in the operation and maintenance of all fire alarm systems, sound systems, security systems, lighting control systems, integrated communication systems, CCTV, MATV, CATV, and all other electrical systems requiring training.

7. Maintenance and Operating Manual

   a. The Contractor shall prepare four (4) copies of a manual describing the proper maintenance and system operation. This manual shall not consist of standard factory printed data intended for dimension or design purposes (although these may be included), but shall be prepared to describe this particular job. This manual shall include the following:

      1) Data on <u>all</u> equipment as listed on the fixture and equipment schedules on the plans. Also data on all fire alarm, telephone system, public address system, security system, lighting control systems, CCTV, MATV, CATV, generator, battery backup system, etc. that are applicable for the project.

      2) A check list for periodic maintenance of all equipment requiring maintenance. (i.e., fire alarm system, security system, generator, battery backup system, etc.)

      3) Maintenance and spare parts data for all equipment.

      4) As-Built wiring for equipment containing field wired systems. (i.e., fire alarm, security, data system, CATV, telephone, public address, etc.)

      5) The manuals shall be bound, indexed, dated and signed by the Contractor when completed.

b. The operating and maintenance manuals shall be submitted to the Engineer for approval. When the manuals are considered complete by the Engineer, they will be turned over to the Owner for their permanent use.

SUBSTITUTION AND PRODUCT OPTIONS

TO: PROGRESSIVE DESIGN COLLABORATIVE, LTD.
Post Office Box 61249
Raleigh, North Carolina 27661-61249

PROJECT NAME:_____

The undersigned requests that the following product be considered for substitution in lieu of the specified item in Project Manual Section_____ Page_____ Paragraph_____ Description of Item:_____

_____

_____

Proposed Substitution:_____

_____

The undersigned certifies that the following statements are correct, unless modified on an attachment:

1. The proposed substitution is equal or better in appearance, function and quality to the specified item, in all respects and is suitable for inclusion in the Work.
2. Attached are 4 copies of the Manufacturers Product Description, Specifications, Data Sheets, Photographs, Test Data and Color Charts.
3. We will furnish a physical sample, if requested by the Architect/Engineer.
4. Every variation of this product is to be listed and clearly delineated on the submission.
5. This substitution will require no dimensional changes to the drawings and will have no effect on other trades, the construction schedule or warranty requirements.
6. List of similar type project in which product is used.
7. Verification from manufacturer that product has been in use a minimum of two (2) years at similar projects.

SUBSTITUTIONS AND PRODUCT OPTIONS:

MANUFACTURER OR REPRESENTATIVE
Submitted by:

Name:_____

Firm:_____

Address:_____

_____

_____

Phone No.:_____

Date:_____

Signature:_____

CONTRACTOR OR BIDDER
Submitted by:

Name:_____

Firm:_____

Address:_____

_____

_____

Phone No.:_____

Date:_____

Signature:_____

By approving and submitting shop drawings, product data and samples, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related hereto, or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the work and of the Contract Documents.

The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect/Engineer's approval of shop drawings, product data or samples unless the Contractor has specifically informed the Architect/Engineer in writing of such deviation at the time of submission and the Architect/Engineer has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's approval.

Architect's Reply:

( ) APPROVED
( ) APPROVED AS CORRECTED
( ) REVISE AND RESUBMIT
( ) NOT APPROVED

ARCHITECT:

_____

By:_____

Signature: _____

Date:_____

Engineer's Reply:

( ) APPROVED
( ) APPROVED AS CORRECTED
( ) REVISE AND RESUBMIT
( ) NOT APPROVED

ENGINEER:

PROGRESSIVE DESIGN COLLABORATIVE

By:_____

Signature:_____

Date:_____

END OF SECTION 26 01 00

SECTION 26 05 19 – WIRES AND CABLES

A. GENERAL

1. All conductors shall be properly marked showing manufacturer's name, insulation type, voltage rating and wire size. All insulation is to be rated for minimum of 600 volts.

2. Wire sizes shall be as shown. No wire smaller than No. 12 AWG shall be used. The maximum wire size shall be 500 kcmil.

3. No. 10 AWG conductors shall be used for 20 ampere branch circuit home runs exceeding 50 feet to the junction point. 20 ampere branch circuit wiring shall be No. 10 AWG throughout if the circuit is longer than 100 feet in total length.

4. Conductors shall be manufactured by Triangle, Okonite, Houston Wire and Cable, or approved equivalents. All wiring and cable shall be listed by an "approved' third party testing agency.

5. Fire alarm and control wiring shall have stranded conductors. Refer to fire alarm specification 28 31 10 and fire alarm guidelines on the State Construction Office website.

B. PRODUCT

1. All conductors shall be copper and shall comply with NEMA WC70. Wires No. 10 and smaller shall be solid. Wires 8 and larger shall be Class B stranded.

2. All wire shall be labeled two (2) feet on centers giving size, type voltage, rating, and manufacturer's name. Wire No. 6 and smaller shall be factory color coded. Wire larger than No. 6 may be color coded with Okonite 2000 volt colored tape at all terminals of the run, and at all junctions.

3. Where applicable, all wire shall be color coded as follows, or approved by the Engineer:

   a. 480/277 volt system:

      1) Phase A - Brown
      2) Phase B - Orange
      3) Phase C - Yellow
      4) Neutral - Natural Gray
      5) Ground - Green

   b. 208/120 volt system:

      1) Phase A - Black
      2) Phase B - Red
      3) Phase C - Blue
      4) Neutral - White
      5) Ground - Green

4. Insulation type shall be labeled for the appropriate type of use and temperature. Insulation types are as follows:

   a. Type THWN/THHN or XHHW for feeders and branch circuit conductors.

   b. Branch circuit wire in fluorescent fixture channels shall be type THHN, or type XHHW with cross-linked polyethylene insulation.

C. EXECUTION

1. Conductors, in all cases, shall be run in conduit and shall be continuous from outlet to outlet. Splices will not be permitted except within accessible outlet or junction boxes, troughs, or gutters.

2. Solid conductors shall be spliced by using Ideal "wing-nuts", 3M Company's "Scotchlok", or T and B connectors in junction boxes, outlet boxes and lighting fixtures. Sta-Kon or Crimp connectors will not be allowed for branch circuit splicing.

3. Joints in stranded conductors shall be spliced by approved mechanical connectors and gum rubber tape or friction tape. Solderless mechanical connectors for splices and taps, provided with UL approved insulating covers, may be used instead of mechanical connectors plus tape.

4. All conductors in any conduit shall be at one specific voltage. Conductors of different voltages shall be run in separate conduits.

5. Neutral conductors shall be properly installed as to prevent grounding of the neutrals in any conduit.

    a. Full size neutral conductors shall be provided for each service panel and sub-panel.

    b. Minimum of full size individual neutral wire shall be provided for each circuit; in other words, no sharing of the neutral between circuits is allowed.

6. Neatly train and lace wiring inside boxes, equipment, and panelboards.

7. Pull all conductors into a raceway at the same time. Use listed wire pulling lubricant for pulling #4 AWG and larger wires.

8. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

9. All current carrying feeder phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt megger. The procedures listed below shall be followed:

    a. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conducts and between conductor and the grounding conductor.

    b. After all fixtures, devices and equipment are installed and all connections completed to each panel, the Contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the Contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The Contractor shall correct troubles, reconnect and retest until at 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.

    c. The Contractor shall send a letter to the Engineer certifying that the above has been done and tabulating the megger readings for each panel. This shall be done at least four (4) days prior to final inspection.

    d. At final inspection, The Contractor shall furnish a megger and show the Engineer’s representatives that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed by the representatives.

10. Use of split bolts is not allowed.

11. A green grounding conductor, sized in accordance with the latest issue of the NEC, shall be installed in all conduits with circuit conductors.

12. All exposed wiring shall be contained in a minimum of 3/4" conduit or surface mounted raceway. This shall include, but not be limited to, fire alarm, security, power distribution, intercom, telephone and communication wiring. Wiring located above a ceiling or inside walls shall not be considered exposed.

13. Conductors for branch circuits shall be sized to prevent a voltage drop exceeding three percent (3%) at the farthest outlet of power, heating and lighting loads, or any combination of such loads. The maximum total voltage drop on both feeders and branch circuits to the farthest outlet shall not exceed five percent (5%).

    a. Where the branch circuit conductor length from the panel to the first outlet on a 277 volt circuit exceeds 125 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Increase the branch circuit conductor size an additional wire size for reach 125' of additional length of the entire circuit. The ground conductor size shall be increased proportionately to the increase in the phase conductors per 2014 NEC 250.122(B).

    b. Where the conductor length from the panel to the first outlet on a 120 volt circuit exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Increase the branch circuit conductor size an additional wire size for reach 100' of additional length of the entire circuit. The ground conductor size shall be increased proportionately to the increase in the phase conductors per 2014 NEC 250.122(B).

14. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information. All required documentation of readings shall be submitted to the Engineer prior to, and as one of the prerequisites for, final acceptance of the project.

END OF SECTION 26 05 19

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SECTION 26 05 33 – CONDUIT AND CONDUIT FITTINGS

A. GENERAL

1. Conduit shall be delivered to the project site in bundles of full length pipes, each length marked with the trademark of the manufacturer and the Underwriters' Laboratories, Inc. stamp. Each conduit length shall be straight, true and free from scales, blisters, burrs and other imperfections.

2. Within the building perimeters and above the floor slab, rigid steel conduit shall be used unless specifically noted otherwise.

3. Conduit size for control wiring shall be a minimum of three-quarter (3/4”) inch conduit. All branch circuit conduit shall be a minimum of 3/4". Percent filled and derating shall be in accordance with the National Electrical Code.

4. All conduit located exterior to the building shall be one (1) inch minimum size.

5. All conduit shall be installed in accordance with the National Electric Code.

6. Surface mounted metal raceway shall be used as noted on the plans in lieu of exposed conduit. Surface mounted raceway shall be manufactured by Wiremold or approved equivalents. A separate ground wire shall be run in the surface mounted raceway.

7. Non-metallic wall conduit described in this specification shall be a minimum of Schedule 40 unless specifically noted otherwise.

8 In all areas where fire rated walls, floors, and ceilings are installed, all penetrations of electrical conduits or other related electrical material shall be properly sealed with approved fire rated materials to maintain the rating of the building construction. See fire-stop system details.

B. PRODUCT

1. Conduit shall be manufactured by: Triangle, G.E., Allied, Wheatland, or approved equal.

2. Conduit fittings shall be manufactured by: Rayco, T&B, Appleton, or approved equal.

3. Thin Wall Conduit and Fittings

   a. Electrical metallic tubing (EMT) shall be cold-rolled steel tubing with zinc coating on the outside and protected on the inside by a zinc, enamel or equivalent corrosion-resistant coating conforming to the latest requirements of ANSI. Conduit shall meet the Rigid Conduit Association Standards.

   b. Electrical metallic tubing fittings shall be all steel plated hexagonal threaded compression type. No pot metal set screws or indenter fittings shall be used. EMT connectors shall have insulated throats.

4. Rigid Steel Conduit and Fittings

   a. Rigid steel conduit, including elbows and nipples, shall be standard weight, mild steel pipe, hot dipped galvanized, sherardised or zinc-coated conforming to the requirements of ANSI C80.1, 1966 or later edition. Rigid steel conduit shall also meet the latest requirements of Underwriters' Laboratories, Inc. Standards for Rigid Metallic Conduit.

b. Fittings shall be of approved types, made of malleable iron hot dipped galvanized.

5. Flexible Metal Conduit and Fittings

a. Flexible metal conduit shall be of the best grade interlocking spiral strip steel. The interlocking spiral strip construction shall be such as to permit bending of the conduit to a radius of four (4) times its internal diameter without distorting at any point. The interior and the exterior of the flexible conduit shall be smooth and free of burrs, sharp edges, or other defects which could damage the wire.

b. All connectors shall be steel compression fittings with insulated throats.

c. Where water tight flexible conduit is required, it shall have an outer sheath of material similar to PVC.

C. EXECUTION

1. General

a. All conduit shall be run tight against walls, columns or ceilings.

b. The conduit shall bend cold 90 degrees about a radius equal to ten (10) times its own diameter without signs of flaw or fracture in either pipe or protective coverings. All bends and offsets shall be made on a forming tool to prevent the conduit or its coating from being damaged in the bending.

c. Where conduits join any couplings or threaded fittings, the ends shall be made watertight.

d. All conduits shall be carefully cleaned before and after erection. After cleaning, all ends of conduits shall be free from burrs and inside surfaces shall be free from imperfections likely to injure the wires or cables.

e. In every instance, conduit shall be installed in such a manner that the conductors may readily and easily be drawn or pulled in without strain or damage to the insulation; and, also, so that defective conductors may be readily and easily withdrawn and replaced by new conductors. Long radius bends and a sufficient number of approved pull and junction boxes shall be approved for this purpose, and as may be directed by the Engineer. All conduit shall be securely supported and grounded.

f. In unfinished areas, exposed conduit shall be run to conform to the building lines with special emphasis on neatness. Location of outlet boxes to support suspended lighting fixtures shall be determined by means of templates prepared to match fixtures. Turns shall be made with galvanized outlet boxes, junction boxes, factory fittings and/or symmetrical bends. Locknuts and bushings shall be employed to provide full grounding and adequate protection of insulation.

g. Support for all conduit shall be in accordance with the National Electrical Code. Conduit shall be supported by approved pipe straps or clamps, secured by means of toggle bolts on hollow masonry; expansion shields and matching screws or standard pre-set inserts on concrete or solid masonry, machine screws or sheet metal screws on metal surfaces, and wood screws on wood construction.

h. All empty conduit systems shall be capped or terminated in a junction box and shall be provided with nylon pull cord inside for future use.

i. Conduit terminating below grade shall be provided with means to prevent entry of dirt or moisture. Depth of burial shall not be less than two (2) feet below grade. All termination points shall be accurately marked and dimensioned on the As-Built Plans.

j. MC cable and flexible metal conduit can only be used as “fixture whip” and related type equipment connection in lengths up to 6’-0” only. EMT conduit and rigid conduit shall be used inside the building as outlined in this specification section.

2. Thin Wall Conduit and Fittings

a. Except for service and feeder conduits, electrical metallic tubing and fittings may be installed in lieu of rigid conduit for 2” (two inch) or smaller in dry construction in furred spaces, ceiling cavities, chase spaces, interior portions other than concrete and solid plaster, or for exposed work except on mechanical structure or supports.

b. Electrical metallic tubing shall not be installed where subject to severe physical damage, nearer than four (4) feet from finished floor in exposed areas, subject to severe corrosive conditions, in trade sizes larger than two (2) inches, located in exterior walls, or in poured concrete.

c. A transition between a run of rigid conduit concealed in a wall and a run of thin wall conduit along a ceiling shall be made in an outlet box above the ceiling, if accessible, near the wall.

3. Rigid Steel Conduit and Fittings

a. All conduit terminations shall be provided with insulating bushings.

b. Condulet fittings shall not be used in lieu of pull boxes.

c. Except where located under the ground floor slab, all service and feeder conduit shall be heavy wall (rigid galvanized).

d. Rigid steel conduit shall be installed in exterior masonry walls, in wet locations where subject to severe physical damage, or where conduit trade size is two and one half (2 1/2) inches or larger.

4. Flexible Metal Conduit and Fittings

a. Flexible metallic conduit shall be provided at the end of each conduit run terminating at the conduit box on electric motors, transformers or other equipment.

b. In ceiling cavities, flexible metallic conduit may be installed from an outlet box to the lighting fixture as a "fixture whip". Conduit smaller than 3/4" shall be limited to lengths of 6 feet or less.

c. The length of flexible conduit shall be in accordance with the National Electric Code.

END OF SECTION 26 05 33

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SECTION 26 05 34 – BOXES AND CABINETS

A. GENERAL

1. The Electrical Contractor shall provide junction boxes, pull boxes, cable, support boxes, and wiring troughs as required by NEC and as otherwise indicated in the Drawings.
2. All necessary mounting hardware and accessories shall be provided for a complete installation.
3. All boxes shall be labeled for its particular application.

B. PRODUCT

1. Boxes shall be as manufactured by Steel City Electric Company, Metropolitan, B & C or approved equal.
2. Outlet boxes shall be 4" square, 2 1/8" deep except as noted below.
3. Outlet boxes shall be equipped with plaster rings of appropriate depth to finish flush with finished walls. Outlets in exposed masonry wall shall be equipped with extra deep square corner tile rings so that box may be installed in the core of the block.
4. Outlets for concealed work and ceiling outlets for exposed work shall be galvanized stamped steel.
5. Wall outlets for exposed conduit work shall be Crouse-Hinds, Appleton, Rayco, or equivalent, series FS and FD switch and receptacle threaded hub boxes, with matching FS and FD covers.
6. Junction boxes larger than 4" square shall be galvanized and without pre-formed knockouts. Junction boxes over 12" square shall have piano hinge covers.

C. EXECUTION

1. Boxes and troughs shall be supported independently of conduit entering them. Brackets, threaded rod hangers with lock nuts, bolts, or other suitable supporting methods may be used.
2. Accessible junction boxes for change of direction or feeder taps shall be furnished where required and shall be of adequate size to prevent crowding of conductors in accordance with the requirements of the NEC.
3. Thru-the-wall outlet boxes shall not be permitted. Boxes shall be separated a minimum of 18 inches apart.
4. In general, outlets shall be installed at the heights indicated. The Contractor shall examine the plans of and coordinate with all other trades to assure mounting heights are correct for the intended purpose. Assure that all mounting heights comply with the latest version of ADA. Outlets installed at incorrect heights shall be relocated to the correct elevation at the Contractor's expense.
5. Each outlet designated on the plans shall be provided with an outlet box, unless noted otherwise.
6. Each outlet box which supports a fixture shall be provided with a fixture stud into the outlet box. Outlet box and/or fixture stud shall be attached with not less than three screws or bolts.
7. All boxes, including covers, for concealed junction boxes shall be painted to correspond to the appropriate color coding of the conduit system connected to the box. See Electrical General Provisions Section 26 01 01 for color coding.

END OF SECTION 26 05 34

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SECTION 26 27 26 – WIRING DEVICES

A. GENERAL

1. Switches, dimmer switches, photocell, contactors and receptacles, with proper cover plates, shall be provided where indicated on the Drawings.

2. All devices shall be labeled for its particular application.

B. PRODUCT

1. All wiring devices shall be as specified in the Symbol Legend of the Drawings.

2. Toggle switches shall be single pole, three-way, or four-way as indicated on the drawings. Switches shall be of the grounding type, with hex-head grounding screw, rated 20A, 120/277 volt, AC only. Lighted handle switches shall have neon lights of the correct voltage rating where indicated on the drawings. All switches shall have quiet operating mechanisms without the use of mercury switches. All switches shall be listed by an “approved” third-party agency, approved for the voltage and amperage indicated.

3. When the Contractor proposes to use a different wiring device than the one specified in the Symbol Legend of the Drawings, he shall submit one of the following manufacture's devices for approval:

   a. Dimmer Switches: Lutron, Leviton, or Pass & Seymour.

   b. Industrial Specification Heavy Duty Grade Receptacles: Hubbell Hubbell-pro series or equals by: Leviton, Pass & Seymour, Bryant or Eagle.

4. Duplex receptacles shall be of the grounding type, arranged for back and side wiring, with separate single or double grounding terminals. Receptacles shall be straight blade, rated 20A, 125 volt and the face configuration shall conform to the NEMA Standard No. WD-1, NEMA WD-6, DSCC W-C-596G and UL-498, and shall be “approved” third-party listed. Self-grounding or automatic type grounding receptacles are not acceptable in lieu of receptacles with separate grounding screw lugs and a direct, green insulated conductor connection to the equipment grounding system.

5. Receptacles shall be industrial specification heavy duty grade mounted vertically. Receptacles mounted over counter, backsplashes, etc shall be mounted horizontally.

6. Cover plates for all wall mounted devices shall be provided as scheduled on the Drawings. Where covers are not specified, they shall be stainless steel and furnished to match the field conditions and outlets provided.

7. All cover plates for all devices shall have the circuit designation serving the device typewritten on adhesive label on the face of the cover plate. Label shall be clear with black lettering.

8. All cover plates shall be semi-jumbo (midi size) as opposed to standard size plates.

9. All stainless steel cover plates shall be 302 alloy, non-magnetic and non-corrosive.

C. EXECUTION

1. Mounting height shall be as indicated on the Drawings. Coordinate with other trades so that devices will miss equipment installed by others.

2. Receptacles shall be industrial specification grade or heavy-duty grade, mounted vertically. Receptacles mounted over counters, back-splashes, etc., shall be mounted horizontally.

3. Special wiring devices shall be shown on the drawings with complete description thereof.

4. Where two or more devices are ganged, they shall be in a common box with a ganged plate.

5. All receptacles shall have a green ground conductor to run parallel with the phase conductor back to the electrical panel.

6. Receptacles shall not be mounted back to back.

7. In all areas where carpet is to be installed as finished floor material, unless otherwise specified, the Electrical Contractor will furnish solid brass carpet flanges for installation on floor outlet boxes. Flanges will be furnished and installed on all active outlets after the carpet is installed. Where a specified number of outlet fittings are to be furnished to the Owner, for each fitting not installed during the construction period, it will be turned over to the Owner with the receptacle, carpet flange and all necessary appurtenances.

8. All wiring devices shall be 20 amp minimum and shall be of the grounding type, with hex-head green grounding screw, to be connected to the green ground conductor. Self-grounding type is not acceptable.

END OF SECTION 26 27 26

SECTION 28 31 11 –FIRE ALARM SYSTEM – EXTENSION

A. GENERAL

When new fire alarm devices are added to an existing fire alarm system, new certification for the FACP shall be issued in accordance with NFPA 72.

1. RELATED DOCUMENTS
   a. Refer to Division 26 Specifications
2. MINIMUM CODES AND STANDARDS
   a. The latest issue of specifications, standards and publications listed below form a part of this specification.
      1) NFPA 72 National Fire Alarm Code
      2) NFPA 70 National Electric Code (NEC)
      3) 2012 North Carolina State Building Code
      4) UL Testing Lab Compliance
      5) Local Codes and Standards
      6) ANSI A17.1
      7) North Carolina Accessibility Code (ADA)
      8) FM Compliance
3. QUALITY ASSURANCE
   a. Manufacturer's Qualifications: Firms regularly engaged in manufacture of fire alarm systems of types, sizes, and electrical characteristics required, and whose products are Listed and Labeled. Products of firms that do not maintain factory authorized service organization and spare parts stock are not acceptable for use on State Owned Buildings.
   b. New Notification Devices shall be by Compatible with the existing system.
   c. Company specializing in performing the work and making the final terminations and connections. Minimum of 5 years documented experience installing fire detection and alarm systems similar in size and scope to the project. Only the Installer may make program changes and must be present for the 100% test, Designer's pre-final review and Owner inspections.
   d. All connections to the FACP and the system's programming shall be done only by the manufacturer, or by an authorized distributor that stocks a full complement of spare parts for the system. The technicians are required to be trained and individually certified by the manufacturer, for the FACP model/series being installed. This training and certification must have occurred within the most recent 24 months, except that a NICET Level III certification will extend this to 36 months. Copies of the certifications must be part of the Shop Drawing submittal to the Designers, prior to installation. The submittal cannot be approved without this information.
4. SUBMITTALS:
   a. Shop Submittals shall provide mA draw for each device submitted and the listed minimum voltage required to operate. Panel submittal shall list voltage drop allowed for panel and for individual NAC circuits.
   b. Shop Drawings:
      1) The fire alarm contractor shall submit complete Shop Drawings to the engineer for review, prior to performing any work. They shall clearly demonstrate compliance with the

engineer's plans and specifications, which have a System Response Matrix showing the fire alarm system's actions (outputs) required for each type of alarm, supervisory, and trouble signal. Any non-compliant features must be fully described.

2) The submitted shop drawings shall show equipment, device identification numbers and locations, and connecting wiring of entire fire alarm system. Include wiring and riser diagrams. Wiring diagrams shall be based on the project floor plans, with devices and proposed conduit routing. The conductor composition for each conduit section shall be provided. The distance and route for each NAC (Notification Appliance Circuit) shall be shown. Riser diagrams shall show consecutive connections for all devices with addresses and candela and Candela ratings.

3) Engineer's approval (with or without corrections) of contractor's Shop Drawings, samples, cut sheets, etc., is for general conformance with the contract documents and design concept. It shall not relieve the contractor of responsibility for full compliance with the project plans and specifications, EXCEPT for any specific non-compliant features for which the engineer gives written authorization.

c. Installation Instructions: The contractor shall submit to the engineer of record the Manufacturer's detailed installation instruction for the new notification devices and their associated wiring and interconnection diagrams., If Notification Appliance Cabinets (NAC) (Power Supply) are required to be added or expanded the contractor shall provide as needed and include in shop submittals for engineers review and approval...

d. Battery Calculations:

1) Include a copy of system battery sizing calculations with the shop drawing submittal to the engineer. Use manufacturer's battery discharge curve to determine expected battery voltage after 24 hours of providing standby power. Then use calculated Notification Appliance Circuit current draw in the alarm mode to determine expected voltage drop at End of the Line Resistor (EOL), based on conductor resistance per manufacturer's data sheet or NEC.

2) Fire Alarm Vendor's calculations must be submitted with the shop drawings, and prior to installation of equipment. In the submittal package identify Notification Appliance Circuits (NAC) current draws and voltage drops for each circuit. In no case shall the calculated voltage at any notification appliance fall below the minimum listed operating voltage for the devices used.

3) The voltage drop at EOL must not exceed 14% of the expected battery voltage, after the required standby time plus alarm time. (Typically, for a 24 volt system, this limits the voltage drop from the battery to the EOL to 3 volts). Determine "worst case" voltage at far end of each NAC, by subtracting its calculated V-drop from the expected battery voltage. The result must be no less than the minimum listed operating voltage for the alarm notification appliances used.

4) All of these calculations must be placed on a dedicated sheet of as-built drawings, for future reference by fire alarm service technicians. NAC voltage drop is to be verified during system tests.

e. Maintenance Data: The contractor shall submit maintenance data and parts lists for each type of fire alarm equipment installed, including furnished specialties and accessories. Include this data, product data, and shop drawings in maintenance manual.

f. Certifications:

1) Submit a certification from the major equipment manufacturer indicating that the proposed supervisor of installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses, and telephone numbers in the certification.

2) Installer's training certificate as defined under Quality Assurance.

B. PRODUCTS

1. ALARM APPLIANCES

a. Programmable Electronic Sounders: Sounders located outdoors shall be listed for use in wet locations. Electric sounders shall operate with synchronized audible output and have the following specifications:

1) Voltage: Programmable electronic sounders shall operate on 24 VDC nominal.

2) Programming: Electronic Sounders shall provide the ANSI 53.41 three-pulse temporal pattern audible evacuation signal, described in NFPA 72, with an output sound level of at least 90 dBA measured at 10 feet from the device. Output sound level shall be 120 dB maximum. Electronic Sounders shall be field programmable without the use of special tools.

b. Strobe Lights shall be located as shown on the Drawings and provided per the requirements of NCSBC chapter #11 and ICC A117.1-2009. Strobe lights indicated for use exterior to the building shall be mounted at the indicated elevation and listed for use in wet locations. Strobe lights shall operate with synchronized flash output and have the following specifications:

1) Voltage: Strobe lights shall operate on 24 VDC nominal.

2) Maximum pulse duration: 2/10ths of one second.

3) Strobe intensity and flash rate: Must meet minimum requirements of UL 1971. Provide strobe lights with minimum intensity Candela (Cd) rating of 15/75 Cd, or greater if shown otherwise on drawings.

c. Audible/Visual Combination Devices shall comply with all applicable requirements for both Programmable Electronic Sounders and Strobe Lights.

2. MISCELLANEOUS SYSTEM ITEMS

1) Indication of Operation: An LED shall be provided that shall flash under normal conditions, indicating that the Monitor Module is operational and in regular communication with the control panel.

a. Addressable Control Module: Addressable Control Modules shall be provided to supervise and control the operation of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual (A/V) Notification Appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay. The control module shall provide address-setting means using DIP switches and shall also store an internal identifying code that the control panel shall use to identify the type of device. An LED shall be provided that shall flash under normal conditions, indicating that the control module is operational and is in regular communication with the control panel.

1) Configuration: The control module NAC circuit may be wired for Style Y with up to 1 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form C) relay. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

2) Power Source: Audio/visual power shall be provided by a separate supervised power loop from the main fire alarm control panel or from a supervised, 3rd party listed remote power supply. AN power sources and connections are not shown on the Drawings

3) Test Switch: A magnetic test switch shall be provided to test the module without opening or shorting its NAC wiring.

b. Battery Power Supply (BPS) &/or Supplementary Notification Appliance Circuit (SNAC): These types of panels shall be completely maintenance free, shall not require liquids, fluid level checks or refilling, and shall not be capable of producing spills and/or leaks. Batteries shall be sealed gel-cell type with expected life of 10 years. Battery voltage shall be as required by the FACP and related equipment. Battery shall have sufficient capacity to power the fire alarm system for not less than 60 hours plus 5 minutes of alarm upon a normal AC power failure. Battery cabinet shall be twice the size of the batteries it will contain. NAC circuits shall not exceed 75% of maximum current load allowed.

3. Wiring

1) The fire alarm wiring shall be plenum rated and installed in accordance with manufacturer's recommendations.

C. EXECUTION

1. FIRE ALARM SYSTEM:

a. The fire alarm system devices and wiring shall be new and furnished with a warranty (parts & labor) of at least one year from the date of final inspection and/or acceptance by the Owner.

b. All equipment supplied must be specifically listed for its intended use and shall be installed in accordance with the manufactures recommendations. The contractor shall consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

c. All system components shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., devices shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load. Adhesives are not permitted to mount fire alarm system components to building surfaces or structure. See Symbol sheet.

2. AC POWER

   a. Systems are to be provided with a separate and independent source of emergency power. Switching to emergency power during alarm shall not cause signal drop-out. Batteries must meet the appropriate NFPA capacity requirements, with a 25% safety factor.

   b. The branch circuit breaker(s) supplying the system must be physically protected by panelboard lock or handle lock and each must be identified with a 1/4" permanent red dot applied to handle or exposed body area.

   c. Provide an engraved label at each fire alarm system control unit, system sub-panel or data gathering panel, notification appliance cabinet (NAC) panel, etc.

3. CONDUIT AND WIRING

   a. The exterior of all junction boxes containing fire alarm conductors shall be painted red; box interiors shall not be painted. Or Box covers for junction boxes containing fire alarm conductors shall be painted red on both sides.

   b. Box covers shall be labeled to indicate the circuit(s) or function of the conductors contained therein. Labels shall be neatly applied black lettering on a clear background. Handwritten labels or labels made from embossed tape are not acceptable.

   c. All plenum rated fire alarm system wiring shall be in metal conduit or surface metal raceway to devices in walls stubbing out above ceilings. All fire alarm system wiring above ceiling shall be free air plenum fire alarm wiring supported on J-hooks.

   d. <u>All wiring shall be color coded.</u> All the circuits in the system shall be wired with AWG 14, minimum, stranded copper, THHN/THWN conductor, installed in metallic conduits. Color Coded wires shall be in accordance with the following scheme, which shall be maintained throughout the system, without color change in any wire run:

      1) Alarm Indicating Appliance Circuits Blue (+)/Black (-)

   e. Detection or alarm circuits must not be included in raceways containing AC power or AC control wiring. Within the FACP, any 120 VAC control wiring or other circuits with an externally supplied AC/DC voltage above the nominal 24 VDC system power must be properly separated from other circuits and the enclosure must have an appropriate warning label to alert service personnel to the potential hazard.

   f. There shall be no splices in the system other than at device terminal blocks, or on terminal blocks in cabinets. "Wire nuts" and crimp splices will not be permitted. Permanent wire markers shall be used to identify all connections at the FACP and other control equipment, at power supplies, and in terminal cabinets. All terminal block screws shall have pressure wire connectors of the self-lifting or box lug type.

   g. 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 (10) megohms, as verified with a megger. Provide advance notice to the Engineer of record of these tests.

   h. The system shall be electrically supervised for open or (+/-) ground fault conditions in SLC, alarm circuits, and control circuits. Removal of any detection device, alarm appliance, plug-in relay, system module, or standby battery connection shall also result in a trouble signal. Fire alarm signal shall override trouble signals, but any pre-alarm trouble signal shall reappear when the panel is reset.

4. NOTIFICATION DEVICES

    a. Both audible and visible alarm signals shall be provided. Visible signals must be the strobe (flash discharge) type, with white or clear lens, and shall comply with current ADA requirements for intensity and placement.

    b. Alarm notification appliance (NAC) circuits shall be NFPA 72 Style Y (Class B). The load connected to each circuit must not exceed 80% of rated module output and the coverage of each circuit shall not exceed 3 floors (to limit the effect of faults, and to facilitate troubleshooting). The NAC voltage drop during alarm must not exceed 14% of the voltage measured across the batteries at that time. To achieve this, the design must consider wire size, length of circuit, device load, inherent voltage loss within the FACP's power supply, etc. The contractor shall use power outage testing to verify that the NAC circuit was designed and installed properly.

    c. End of Line (ECU) Device: The end of line device shall be installed in accessible terminal cabinets or dedicated accessible boxes, to facilitate testing and maintenance.

5. ALARM VERIFICATION FOR SMOKE DETECTORS. The fire alarm system shall be equipped with Alarm Verification.

6. FIRE ALARM SYSTEM INSTALLATION AND CONFIGURATION

    a. Graphic Chart must be mounted behind Plexiglass and secured to surface. Mounting shall be such that charts cannot be removed without a flat head screwdriver.

    b. Floor Plans with Device Numbers: A copy of the floor plans shall be provided in the control panel. A separate sheet shall be provided for each floor. Plans shall be reduced in size from engineering plans in order to fit on 11 x 14 sheets. All device addresses shall be clearly labeled on plans. Indicate locations of all cabinets, modules and end of line device. Plans shall be bound in book form. Sheets shall be laminated. Provide legend for symbols. Provide holder for plan book in panel or in a locked box adjacent to panel keyed to match panel. Provide label for box and book.

7. SYSTEM DOCUMENTATION, TRAINING, AND MAINTENANCE

    a. System Report In addition to the Shop Drawing submittal described elsewhere, the fire alarm system contractor shall provide the engineer two bound copies of the following technical information, for transmittal to the owner:

        1) As-Built wiring diagram showing all loop numbers and device addresses, plus terminal numbers where they connect to control equipment.

        2) As-built wiring and conduit layout diagrams, including wire color code and/or label numbers, and showing all interconnections in the system.

        3) Electronic circuit diagrams of all control panels, modules, annunciators, communications panels, etc.

        4) Manufacturer's detailed maintenance requirement.

        5) Technical literature on all control equipment, isolation modules, power supplies, batteries, detectors, manual stations, alarm/supervisory signal initiating devices, alarm notification appliances, relays, remote alarm transmission means, etc.

        6) The as-built "calculations" sheet.

    b. The contractor shall provide the owner with one copy of the following:

1) Framed floor plans, mounted at the FACP and RACP. Plans shall show all system devices with the unique device identification numbers indicated adjacent to each device. The identification numbers shall match those represented in the as-built drawings and those reported at the FACP and the LCD annunciator.

    a) Manuals, drawings, and technical documentation. Actual system software used for training shall be provided in digital form and shall be left with the Owner at the completion of training for the Owner's use in the future.

8. SYSTEM TESTING & CERTIFICATION

    a. Upon completion of the installation the Contractor and the Manufacturer's authorized installer together shall conduct a 100% performance test of each and every alarm initiating device for proper response. The system shall operate for 48 hours prior to start of test. The Contractor shall be present for the full 100% test.

    b. The A/E and owner must be given 7 days advance notice of the tests. All Audio Visual Device Testing shall be scheduled with the owner.

        1) The digital communicator shall be on-line and tested for proper communication to the receiving station.

        2) All testing described above shall be repeated in the event that subsequent software or wiring modifications are determined necessary to meet the requirements of the contract documents. Such re-testing shall be included as part of the base bid and provided at no additional cost to the Owner.

    c. Test Documentation: The installer must fill out and submit the following documentation to the owner, through the engineer, prior to the AHJ's system acceptance inspection:

        1) Written verification that this 100% system test was done with copy of print out generated during test.

        2) The NFPA 72, "Record of Completion" Form. Use this form (no substitutes) to detail the system installation and also to certify that: (a.) It was done per Code, and (b.) The Code-required 100% test was performed. The fire alarm installer (manufacturer or authorized distributor's technician) must sign this form. If a representative of the AHJ, owner, or engineer witnesses the tests, in whole or in part, they must also sign the form to signify that fact only (annotating the form as needed to clarify their limited role).

    d. After completion of the 100% system test and submission of documentation as described above the installer is to request the engineer to set up an inspection. The system must operate for at least two days prior to this inspection The responding Fire Department shall be notified of this, for pre-fire planning purposes. On local government projects, local fire authorities may also want to participate in system acceptance inspections. However, for State-owned property they have no inspection jurisdiction and, if present, are only to observe.

9. PRE-FINAL INSPECTION: At the Owner's request and after passing the Designer's pre-final inspection, the Contractor and Manufacturer's authorized installer will conduct system test in the presence of the Owner and the Designer.

10. FINAL INSPECTION: The fire alarm system will be inspected, verifying that devices initiate upon general alarm conditions, and that system reports to supervising station. fire extinguishing systems and any off-premises supervising station.

END OF SECTION 28 31 11