PROJECT MANUAL

Roanoke Island Aquarium – Elevator Renovations
Manteo, North Carolina

Department of Natural and Cultural Resources

SCO #22-14684-01A

Cahoon and Kasten Architects

March 31, 2023

ADVERTISEMENT FOR BIDS

Sealed proposals will be received until 2:00 PM ON May 11. 2023, in the Roanoke Island Aquarium Conference Room, 374 Airport Road, Manteo, NC., for the Roanoke Island Aquarium – Elevator Renovations at which time and place bids will be opened and read.

Complete plans and specifications for this project can be obtained from Cahoon+Kasten Architects, 118 W. Wood Hill Dr., Nags Head, NC 27959, (252)441-0271 during normal office hours after March 31, 2023.

Plan Deposit $50. Electronic Plans are free of charge.

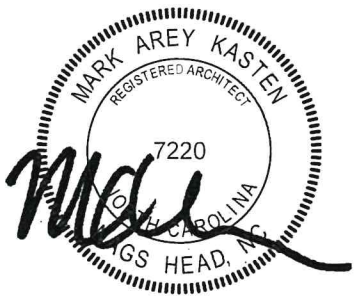
The state reserves the unqualified right to reject any and all proposals.

Signed: _____
(Owner Rep.)

Mark A. Kasten, AIA, LEED AP

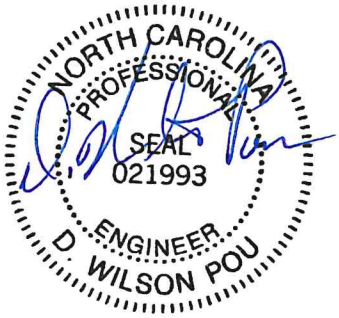
Professional Seals

Architect



Mark Kasten
Cahoon+Kasten Architects

Plumbing Mechanical
Electrical Engineer



Wilson Pou
Engineering Source

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 ($)_____.

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

County of _____

(Name of Bidder)

Affidavit of_____

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

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

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

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

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

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

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

County of _____

Affidavit of _____
(Name of Bidder)

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

_____ contract.
(Name of Project)

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

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

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

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

SEAL

State of _____, County of _____

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

Notary Public _____

My commission expires _____

Do not submit with bid Do not submit with bid Do not submit with bid Do not submit with 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 _____

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DIVISION 01 - General Conditions

010001	Informal Contract
010002	Supplementary General Conditions

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

FOR

Department of Natural and Cultural Resources
NC Aquariums
Roanoke Island Aquarium - Elevator Renovations
SCO #22-24684-01

SCOPE OF WORK

Replacement of existing elevator and installing new floor trench drain at second floor to avoid salt water intrusion into the elevator shaft.

NOTICE TO BIDDERS

Sealed bid for this work will be received by:

James Mancari
Department of Natural and Cultural Resources
Conference Room, 374 Airport Rd, Manteo, NC
P.O. Box 967, Manteo, NC 27954
(252)475-2300,(252)473-1980

up to 2**:00 PM**, on May 11, 2023 and immediately thereafter publicly opened and read aloud. Complete plans and specification and contract documents can be obtained from

Cahoon+Kasten Architects
118 W. Wood Hill Dr., Nags Head, NC
(252)441 0271

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.

No bid may be withdrawn after the opening of bids for a period of 30 days. The Owner reserves the right to reject any or all bids and waive informalities. Bids shall be made only on the BID/ACEPTANCE form provided herein with all blank spaces for bids properly filled in and all signatures properly executed.

Please note on the envelope – **Bid : Attn**: James Mancari

SCO #22-24684-01 Roanoke Island Aquarium - Elevator Renovations
(Bid Date)
(Contractor)
(License Number)

BID/ACCEPTANCE FORM

for

Roanoke Island Aquarium – Elevator Renovations
SCO #22-24684-01

Replacement of existing elevator and installing new floor trench drain at second floor to avoid salt water intrusion into the elevator shaft. Project is located at 374 Airport Rd., Manteo, NC

The undersigned, as bidder, proposes and agrees if this bid is accepted to contract with the *State of North Carolina* through the Department of Natural and Cultural Resources for the furnishing of all materials, equipment, and labor necessary to complete the construction of the work described in these documents in full and complete accordance with plans, specifications, and contract documents, and to the full and entire satisfaction of the *State of North Carolina* and the Department of Natural and Cultural Resources for the sum of:

BASE BID: _____ Dollars $ _____

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.)

ACCEPTED by the STATE OF NORTH CAROLINA

through the

_____
(Agency/Institution)

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

BY: _____ TITLE: _____

Date: _____

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, The State of North Carolina through the Department of Natural and Cultural Resources.

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

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

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

INTENT AND EXECUTION OF DOCUMENTS

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

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

4. AS-BUILT MARKED-UP CONSTRUCTION DOCUMENTS

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

5. SUBMITTAL DATA

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

6. SUBSTITUTIONS

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

Submittals for proposed substitutions shall include the following information:

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

b. Trade name, model or catalog designation.

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

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

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

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

7. WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

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

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

8. MATERIALS, EQUIPMENT, EMPLOYEES

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

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

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

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

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

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

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

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

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

9. CODES, PERMITS AND INSPECTIONS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

11. SUBCONTRACTS AND SUBCONTRACTORS

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

12. CONTRACTOR-SUBCONTRACTOR RELATIONSHIPS

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

13. CHANGES IN THE WORK AND CLAIMS FOR EXTRA COST

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

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

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

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

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

1. Where the extra work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, Owner and State Construction Office the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except 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” and Methods "c(2)" above, the allowances for overhead and profit combined shall be as follows: all contractors (the single contracting entity (prime), his subcontractors(1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc.) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1st tier, 2nd tier, 3rd tier, etc. contractors shall be allowed a maximum of 2.5% on the contracted work of their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.

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

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

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

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

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

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

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

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

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

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

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

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

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

14. ANNULMENT OF CONTRACT

If the contractor fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the contractor shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the owner may give notice in writing, sent by certified mail, return receipt requested, to the contractor and his surety (if applicable) of such delay, neglect or default, specifying the same, and if the contractor within a period of seven (7) days after such notice shall not proceed in accordance therewith, then the owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the contractor, or the surety (if applicable) shall fail to take over the work to be done under this contract within seven (7) days after being so notified and notify the owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of 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.
c. Following 50% completion of the project no further retainage will be withheld if the contractor/subcontractor has performed their work satisfactorily.
d. Exceptions:
    1. Owner/Contractor can reinstate retainage if the contractor/subcontractor does not continue to perform satisfactorily.

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

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

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

18. PAYMENTS WITHHELD

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

a. Faulty work not corrected.

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

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

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

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

ii. Evidence that subcontractors have not been paid.

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

19. MINIMUM INSURANCE REQUIREMENTS

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

a. **Worker’s Compensation and Employer's Liability**

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

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

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

24. TAXES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

25. EQUAL OPPORTUNITY CLAUSE

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

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

26. 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.

27. 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.

28. CONTRACTOR EVALUATION

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

SUPPLEMENTARY GENERAL CONDITIONS

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 one hundred twenty-eight (128) 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) 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

All pay request should be submitted on AIA Document G702 w/ updated Schedule of Values

UTILITIES

Contractor shall be allowed to use on site water, power, and restroom facilities.

USE OF SITE

Contractor shall have full access but limited to the area of the work..

NO SMOKING POLICY

There shall be no smoking on site

SITE SIGNAGE

The Contractor shall include a job site sign stating “FIRE ARMS ARE PROHIBITED ON STATE CONSTRUCTION PROJECT SITE AND ON STATE OWNED PROPERTY.”

DIVISION 02 - Sitework

024119 Selective Demolition

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.

1.2 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 INFORMATIONAL SUBMITTALS

A. Engineering Survey: Submit engineering survey of condition of building.

B. Proposed Protection Measures: Submit report that indicates the measures proposed for protecting individuals and property, for dust control and, for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of selective demolition activities with starting and ending dates for each activity.

D. Predemolition photographs or video.

1.4 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

F. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.5 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.

3.2 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

B. Remove temporary barricades and protections where hazards no longer exist.

3.3 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Maintain fire watch during and for at least 1 hour after flame-cutting operations.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

3.4 CLEANING

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

DIVISION 03 - Concrete

033000 Cast-In-Place Concrete

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.4 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

2.4 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm)] nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

D. Water: ASTM C 94/C 94M and potable.

2.5 FIBER REINFORCEMENT

A. Synthetic Micro-Fiber: Monofilament polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm long.

B. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches (25 to 57 mm.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

2.7 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa at 28 days.
2. Maximum W/C Ratio 0.40
3. Slump Limit: 4 inches (100 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than a rate of 1.5 lb/cu. yd. (0.90 kg/cu. M).

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.6 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

END OF SECTION 033000

DIVISION 05 - Metal

055000 Metal Fabrication

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Metal ladders.
3. Elevator pit sump covers.

B. Products furnished, but not installed, under this Section include the following:

1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

B. Structural Performance of Aluminum Ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

C. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

B. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

C. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.7 METAL LADDERS

A. General:
1. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch (12.7-by-64-mm) steel flat bars, with eased edges.
3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Galvanize ladders, including brackets.

2.8 ELEVATOR PIT SUMP COVERS

A. Fabricate from 3/16-inch (4.8-mm) abrasive-surface floor plate with four 1-inch- (25-mm-) diameter holes for water drainage and for lifting.

2.9 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

DIVISION 14 - Conveying Equipment

142110 Hydraulic Elevator

SECTION 142110 –HYDRAULIC ELEVATOR

PART 1 – GENERAL

1.1 SCOPE

A. Modernize One (1) passenger elevator with a rated load of 2,500 pounds, to be Single Selective Collective Operation, Speed 150 fpm. Serving floors 1 and 2, two (2) landings. State ID# 18837

It is the purpose of this specification to include all labor, material, tools, rigging and equipment necessary to:

1. Modernize passenger elevator complete in every respect, make code and ADA required changes, and meet the requirements as indicated and/or specified. The elevators are located at Roanoke Island Aquarium, Mateo, NC.
2. Coordinate the work of this Section with the work of other Sections as required to properly execute the work as necessary to maintain satisfactory progress of the work of other Sections.
3. The alterations of the elevators must be properly coordinated so that the building will not be without elevator service at any time. Schedule the removal of elevator from service with the Owners representative.
4. If these specifications are not complete as to any minor detail of a required feature, or with regards to the manner of combining or installing parts, material, or equipment, but there exists an acceptable trade standard for good and workmanlike practices, such detail shall be deemed by implication to have been required by these specifications in accordance with such standard.
5. Any component listed as remaining existing in this document must be fully inspected by the contractor to meet current Code requirements. Any repairs or refurbishment of retained devices or components is to be included in Contractor's Base bid.

B. This specification is intended to cover the alterations/ modernization as shown on the plans and specified hereinafter.

C. The major elevator components shall be the products of one manufacturer of established reputation, except they may be the products, either wholly or in part, of another manufacturer if of established reputation provided such items are engineered and produced under coordinated specifications. Any contractor who proposes to install any "major elevator component" not manufactured or normally assembled by him, as part of his equipment, shall have such product approved by the North Carolina Department of Labor, Elevator Bureau, prior to bidding this specification. Also, the major components to be furnished shall be of a make or makes that have performed satisfactorily together under conditions of normal use in not less than twenty-five (25) other elevator installations of equal or greater capacity and speed for a minimum of three (3) installations in North Carolina.

Upon request, the names and addresses of the building and the names of the owners and manager thereof, in which the proposed combination of major components has so performed shall be furnished.

1. The term "major elevator components" as mentioned above shall mean such items as the hydraulic pumping units, pumps, motors, valve(s), jack assembly, controllers, door operators, and related equipment.

2. The major components shall be installed and so arranged that parts can be removed for repairs or replacement by conventional means, without dismantling or removing other equipment and components. Sufficient workspace for maintenance and repair operations shall be provided around the elevator equipment in the machine room with clear passage to any access or trap doors.

1.2 REFERENCES

A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:
   1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by NCDOL.
   2. ASME/NFPA 70 National Electrical Code.
   3. ASME/NFPA 80 Fire Doors and Windows.
   4. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
   5. AMSE/A17.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
   6. ASME/UL 10B and ASTM E152, Fire tests of door assemblies.
   7. Model building codes.
   8. All other local or applicable codes.

B. Make application for, secure and pay for all necessary permits and certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.

C. In addition to the permits, inspections and test specified and the governing codes, the elevator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.

D. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.

1.3 RELATED WORK OF OTHER SECTIONS

A. Required Work by Elevator Contractor as part of the base bid:

   a. Cleaning and painting of hoistway equipment and other equipment as indicated in the specifications. Provide (2) coats of ASTM B117 rated primer, (2) coats ASTM B117 paint to all steel surfaces in the hoistway. This is including but not limited to hoistway beams, angles, channels, and all steel elevator components.
   b. Replace existing pit access ladder, as per code requirements. Paint ladder two coats with semi-gloss enamel paint. Provide non-slip ladder rungs, applied tape is not acceptable.
   c. Paint hoistway facias, door hanger covers and car toe guards. Paint both sides of the door hanger cover’s which are visible from the landing side of the entrances. Existing door hanger covers shall be reused, cleaned, and painted.
   d. Pipe and wire the existing car telephone circuits to the elevator controllers.
   e. New car communication (telephone) shall be provided and installed as part of the new car operating panel, as per code AMSE A17.1-2019 requirements of voice, text and video.

f. Obtain approval prior to bid if the new elevator hydraulic pump motor exceeds a 20 H.P. rating. Electrical feeders are designed to accommodate up to a 20 H.P. rating.
g. Replace all existing electrical wiring, traveling cables, conduit, duct, junction boxes and fittings in the elevator hoistway. Travel cables shall be routes from the car to the controller without splices.
h. Route all hoistway wiring, such as hall position indicators, hall push button fixtures, hoistway interlocks, limit switches, etc., in liquid tight flexible nonmetallic conduit.
i. Route all wiring on the car top in liquid tight flexible metal conduit or metal conduit.
j. All connectors used for metal conduit shall be compression type. Screw type connectors are not permitted.
k. All fastening hardware to be used for installation is to be #316 stainless.
l. Remove any elevator conduit from behind the pit ladder and reroute.
m. Fire caulking as required in the hoist-ways.

B. Site Visit and Inspection of Existing Equipment:
1. By submitting a bid, Contractor certifies that he has visited and inspected the site and existing facilities and has informed himself in detail as to all existing conditions that may affect the work. Failure to do so will not be considered sufficient justification for additional compensation and/or extension of contract time.
2. For access to the building, arrangements must be made through the Architect and Owner.

1.4 SUBMITTALS

A. Shop Drawings, Descriptive Data: Submit samples of all natural metal finishes for approval. Submit accurately dimensioned drawings prepared for this project detailing all fabrication of custom assemblies and layouts of standard items. Shop drawings shall include but not be limited to the following:

1. Dimensioned Layouts: Controller location in machine room.
2. Design Information: Indicate equipment lists and design information on layouts.
3. Design of car enclosure, showing elevations and details.
4. Power Confirmation Sheets: Include KVA, starting current, full load running current and demand factor for applicable static control devices.
5. Certificates: Submit certificate of elevator performance with contract closure documents. After adjustment tests and inspection are performed, forward certificate signed by elevator manufacturer stating that the equipment and controls provide elevator service as specified.

6. Information for Operation and Maintenance:
a. Three (3) sets of wiring diagrams with field changes.
b. Three (3) sets of parts manuals for all components.
c. Three (3) sets of trouble shooting manuals.

These shall include:
a. Description of the elevator system’s sequence of operation and control including the functions of signals, door devices and other features. Provide any special tools needed to maintain or trouble shoot equipment.
b. Written instructions for the trouble shooting adjustment and care of the entire equipment.
c. Electrical prints shall be reproducible type, non-fading.
d. One set shall be sealed in a clear material and mounted in the elevator machine room.

e. All electrical wiring diagrams shall be "as built" drawings. If standard drawings are used they shall be marked up according to the installation for which they apply.
f. Provide two sets of keys for every key switch applicable to the elevators, including the controller cabinets if required. Provide two (2) elevator door emergency unlocking device keys.
g. The identification label for each diagram and manual shall include the subject, building name, location, contract number, the specified state assigned elevator number to which the diagrams and manuals apply.
h. Three set of diagrams and manuals shall be delivered to the designer who will deliver them to the engineering officer of the facility and,
i. The elevator contractor shall notify the North Carolina Department of Labor for scheduling of a final inspection as per code and specifications. Approval must be given that all code requirements have been met and that installation complies with the specifications before final payment will be made.

7. Verification that manufacturer warehouses parts locally with immediate access to major components (rotating elements, etc.).
8. Provide the tool and/or diagnostic equipment and software to adjust, troubleshoot, and maintain the elevator control system. Any cost to keep tools updated and operable to be included in the base bid. Provide instruction manuals in the operation of these special tools. If a special agreement is required, provide a copy with your bid.
9. Provide signs for elevator out of service, in format approved by Owner.
10. Provide approved barricades at all openings where open hoistways are open to view.
11. Dimensioned layout of elevator machine room is not required. This layout must show all equipment in the elevator contract, as well as air units, ductwork, mechanical, electrical, and plumbing lines, structural elements and anything else which may impinge on the use of the rooms. Code required clearances must be acknowledged.
12. For each elevator, prepare and provide a written Maintenance Control Program (MCP) that complies with ASME A17.1/CSA B44 Section 8.6, including written documentation that details the test procedures for each test that is required to be performed by ASME A17.1/CSA B44. Assemble all MCP documentation, and supporting technical attachments, in a single MCP package and provide in both electronic and hard copy. Assemble entire hardcopy MCP in 3-ring binders. For each elevator provided, the MCP must include only documentation and instruction that apply to elevator specified. For each elevator, provide an additional, separate binder that includes all maintenance, repair, replacement, call back, and other records required by ASME A17.1/CSA B44. The records binder must be kept in the elevator mechanical room, maintained by elevator maintenance and service personnel, and be always available to authorized personnel. Provide detailed information regarding emergency service procedures and elevator installation company personnel contact information.

1.5 CERTIFICATIONS

A. Reports on in-place testing of elevators in conformity with Rules of the latest edition of the ASME Code and Current Supplements.

B. Material Certification: Provide written certification that materials used meet specified requirements.

C. Installation of Certification: The Elevator Contractor shall provide written certification stating that elevators are completed and operational per specifications.

1.6 PERMITS, CODE, INSPECTION CERTIFICATES

A. Make an application for secure and pay for all necessary permits and Certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities.

B. All work, material, fabrication, design, and equipment shall comply with the requirements, rules and latest approved practices of the National Electrical Code, latest edition of the ASME A17.1 Code, applicable requirements of Sections 8.6 and 8.7, latest edition of the ASME A17.3 Code, the Americans with Disabilities Act and the rules and regulations of all other governing bodies which may have jurisdiction where the equipment is to be installed.

C. Before final acceptance of the work, furnish the Owner certificates of inspection and approval as required by the authorities having jurisdiction. Make tests as specified and as required by the regulations and in the presence of the proper authorities or Owner's representative.

D. In addition to the permits, inspections and tests specified and the governing codes, the Elevator Contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense. Elevator Contractor to participate in fire service tests to assure that equipment operates as required in emergencies.

1.7 MAINTENANCE

A. The elevator modernization contractor will assume maintenance on the elevator at notice to proceed.

B. Modernization Maintenance Period: Maintenance service consisting of a minimum of monthly examinations, adjustments and lubrication of the elevator equipment shall be provided by the Contractor for a period of twelve (12) months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the Contractor. All work shall be performed by competent employees during regular working hours of regular working days. This service shall not cover adjustments, repairs, or replacement of parts due to negligence, misuse, abuse, or accidents caused by persons other than the Contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

C. The contractor shall provide a service manual for each elevator describing monthly, quarterly, and annual maintenance tasks. Each task shall include an area for signature by a Certified Elevator Technician upon completion of task. The service manual shall also include page/s for documenting all required inspections and tests. The service manual shall contain a section to record all related maintenance, repair, and replacement information in accordance with ASME A17.1, Part 8.6 and remain on site.

D. The contractor shall provide documentation and shall perform monthly testing of fire service recall operation as per ASME A17.1 and ASME A17.2.

E. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. The manufacturer of original equipment shall produce parts.

F. The contractor shall have full-time service personnel within one hour (1) radius of the project site. Contractor's superintendent shall be present as well while any workers are on site.

G. Maintenance service shall include all required tests for inspection services as required by NCDOL Elevator Bureau and ASME A17.1

1.8 WARRANTY

A. Warranty: The Elevator Contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work and labor will be free from defects for the period of Twelve (12) months upon acceptance of Contractor's work by Owner, provided that manufacturer approved preventative maintenance program is in effect during the Guarantee/Warranty period, and that the Work will conform with the requirements of the Contract Documents. The Contractor's Warranty is only subject to the exclusions specified in the Contract or herein.

B. The guarantee excludes ordinary wear and tear or improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the Elevator Contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. Any defective condition or workmanship not mutually agreeable as satisfactory to building owner and Elevator Contractor shall be determined by the independent elevator consultant as final for the replacement, repair or continued use or product or part in question.

C. Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of one year from the date of completion of the Work.

D. In addition to Contractor's above-mentioned warranties, Contractor shall, for the benefit of the Owner, obtain and assign to Owner, if necessary, warranties from the manufacturers, producers, and suppliers whose products are incorporated into or used in the work performed hereunder. All work and materials provided pursuant to the warranties hereunder shall be performed at no charge to the Owner.

E. Contractor warrants that (a) the Work shall be completed in accordance with the Contract Documents and in compliance with all federal, state and local laws, ordinances and regulations, and (b) all materials and equipment furnished by Contractor will be of good quality and new, unless otherwise specified in the Contract Documents.

1.9 MANUFACTURER

A. The following elevator controls are accepted as equals. Equal products are accepted under the requirements of these specifications and/or pre-approved by the Owner and Architect.

<u>Controls:</u>
Motion Controls (MCE)
Smart Rise
Virginia Controls
GAL Controls

B. Elevator Contractor must be able to demonstrate that he has installed and maintained similar elevators to those specified and which have given satisfactory service; has been in successful

operation for at least ten (10) years; maintains locally an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work.

The controller must use non-proprietary parts.

1.10 BIDDER'S QUALIFICATIONS

1. The Bidder shall have technical qualifications of at least three years' experience and trained supervisory and installation personnel to install specified items.
2. Any manufacturer's product submitted shall have been in satisfactory and efficient operation on not less than twenty-five installations like this project, and for not less than one and one-half years.
3. The contractor shall submit a list of five (5) installations by the contractor of the control system and machine proposed for use on this project.
4. The Contractor shall have available under his direct employment and supervision the necessary personnel, organization, and facilities to properly fulfill all the service and conditions required under these specifications.
5. Contractors must have access to necessary tools, diagnostic equipment and software to maintain the solid-state controlled equipment included in the specification. Evidence of this requirement shall be submitted with the bid and shall include references from customers with full-service maintenance on solid state-controlled elevator equipment of the same make and model as bid.
6. The Bidders may be required to submit to the Owner's Representative a resume of experience of the assigned foreman and mechanics, names and addresses of persons authorized to accept or reject work performed under this contract and a financial capacity to perform this contract (Dunn Rating or equal).
7. Maintaining this elevator equipment in a safe condition within proper operating limits in accordance with original manufacturer's equipment specifications is of paramount importance.
8. Requests for information contained in Item 4 may also occur at any other time during the effective period of this contract, or any extension/renewal thereof.

1.11 CONTRACTOR RESPONSIBILITY

A. The Contractor shall carefully review specifications and existing building conditions as they may affect the design, installation, use, and maintenance of the traction elevators. The Contractor shall submit with his bid a certificate in writing stating his acceptance of all such elements of the design. Any exceptions shall be noted on this certificate. **The cost for any changes required to produce a full, workable, code complying elevator system shall be borne by the Contractor.**

B. The electrical design for the hydraulic elevators will be based on the power feeders and disconnect devices as specified in the electrical specification sections.

C. The Elevator Contractor shall remove all superseded equipment not retained by the owner at Contractors expense. Specific items to be retained will be removed by the Elevator Contractor and delivered to the owner's choice of location. If the owner has no use for the removed items, the Elevator Contractor shall dispose of them.

D. Where access to the pit is by means of the lowest hoistway entrance, provide a vertical ladder on the interlock side of the access door extending a minimum of 48" above the sill of the access door in accordance with ASME A17.1 Code. The elevator contractor shall relocate

conduit, raceways, or any other equipment that interferes with the installation or relocation of the pit ladder on the interlock side of the access door.

E. The Elevator Contractor shall coordinate their work and cooperate with the Owner and/or their contractor responsible for performing work under Article 1.3.

F. The Elevator Contractor shall be responsible for all cutting and patching required by their work. Elevator Contractor shall provide fire stops as required by code for all wiring, etc. that penetrates fire rated walls.

PART 2 – PRODUCT

2.1 Elevator equipment shall be, in general, the manufacturer's top-of-the-line products, modified as required to operate with existing components.

2.2 EQUIPMENT SCHEDULES

A. Modernization Summary for One (1) Existing Hydraulic Passenger Elevator, Roanoke Island Aquarium

Machine Room	
Complete Pumping Unit	New
Pump and Motor	New
Valves	New
Controller	New
Leveling Devices	New
Hoistway	
Hydraulic Jack Assembly	New twin post hydraulic
Normal & Final Limits	New
Hoistway Door Interlocks	New
Hoistway Closers	New
Hoistway Door Panels	New, stainless steel
Hoistway Door Hanger Covers	New
Hoistway Facias	Reuse existing, clean and paint both sides
Hoistway Door Hangers & Rollers	New
Hoistway Door Bottom Guides	New
Hoistway Door Frames	Reuse existing, clad with stainless steele
Hoistway Door Headers/Struts	New
Unlocking Devices	New
Guide Rails	Reuse existing, clean.
Buffers and Pit Channels	New
Car Frame	Reuse existing, clean and paint.
Car Enclosures	Reuse, refurbish as per plans.
Top of Car Operating Devices	New
Platform	Reuse, clean and paint
Ceiling	New per plans
Ceiling Lighting Fixtures	New
Certificate Frames	New
Emergency Lighting	New

Car Hangers and Tracks	New
Car Door	New, stainless steel
Front Return Panels, Headers & Jambs	New
Floor Covering	New per plans
Car Door and Sill	New
Communications	New
Door Operator	New, heavy duty
Door Protection	New
Signals	New, extender type. All fixtures shall be vandal resistant stainless-steel type, etched for illumination. All signage shall be engraved in the new hall and car fixtures.
Car Operating Panel	New Phase II instructions and all other required wording shall be engraved. Locate fire fighters panel as per code.
In Car Lanterns	New
Hall Push Buttons Fixtures	New, vandal resistant, stainless steel, extender type with engraved signage and fire sign. Patch and paint as required.
Hall Lanterns	New in hall call station. Remove existing and patch hole.
Car: Raised Nos. and Braille	New
Frames: Raised Nos. and Braille	New
Fireman's Service	New
Emergency Lighting	New
Maintenance Service	As per specifications
Traveling Cable	All wiring for security card reader, camera and video provided for future use. In addition to the 10% spare wires, each traveling cable shall be arranged to provide no fewer than eighteen (18) individually shielded pairs of 18-gauge twisted pair and two (2) RG-6/U solid center conductor coax cable for CCTV monitoring one (1) coaxial cable spare for future security requirements. Run one coax and power supply to location in car for CCTV camera. All cables must be separated from any high voltage. Provide a termination box to hand off travel cable wires for use by others (security, AV. Etc.) Clearly mark wires on both ends.

2.3 PERFORMANCE

A. Speed: +/- 5% under any loading condition.

B. Capacity: Safety lower, stop and hold rated load.

C. Leveling: +/- ¼" with rated load and under normal operating conditions.

D. Door Closing Time, Thrust and Kinetic Energy shall comply with ASME A17.1 Code and ADA.

2.4 POWER UNIT

A. The power unit (oil pumping and control mechanism) shall be compactly and neatly designed, with all of the components listed below combined in a self-contained unit.

B. Pump shall be especially designed and manufactured for oil hydraulic elevator service.

C. Noncombustible oil shall be used for pumping system.

D. Motors shall be high starting torque, single speed, of standard manufacturer and of duty rating to comply with herein specified speed and loads.

E. New hydraulic pump incorporated in submersible pump unit.

F. Valve: The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control up and down starting, acceleration, transition from full speed, up and down stops, pressure relief and manual lowering. All these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and shut-off valve. All valves must be located as to make them readily accessible for servicing. Provisions shall be incorporated to securely lock all adjustments.

G. Tank: Provide storage tanks constructed of steel in conformance with ASME A17.1.

H. Power Controller: a power controller shall contain necessary electrical silver contactors, electro-mechanical switches, and thermal overload relays. Components shall be mounted in NEMA 1 enclosure. Logic control system shall be microprocessor based, integrated solid state circuitry. System shall be protected from environment and vibrations.

I. Piping: New, all necessary pipe and fittings to connect power unit to jack unit, and a complete charge of oil of the proper grade shall be furnished to each unit. A main line strainer and shut-off assembly of the self-cleaning type with a 60-mesh element, and a magnetic drain plug shall be furnished and installed in the oil line. The unit shall be designed for 400 psi working pressure, shall be compact in design with easy access for cleaning. Sound isolating couplings, a minimum of two, shall be installed in the oil line in machine room between pump and jack. Each Coupling shall consist of two machined flanges separated by a neoprene seal to absorb vibration and to positively prevent metal-to-metal contact in the oil line. Couplings shall be designed and manufactured in such manner that they will be absolutely blowout proof. Oil-hydraulic silencer (muffler device) shall be installed in the oil line near power unit.

J. Vibration pads shall be mounted under the power unit assembly to isolate the unit from the building structure.

K. Provide identifying numbers on power unit, controller and disconnect switch.

L. Electrical Circuit Failure Protection. The electrical control circuit shall be designed so that if a malfunction should occur, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. Power operated doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the door open button in the car station, shall be made inoperative. The malfunction shall then be corrected, and the elevator placed back in service through the mainline disconnect switch.

2.5 MOTION/MOTOR/OPERATION CONTROLLERS (NEW) (NON-PROPRIETARY)

Microprocessor Control System: Provide manufacturer's standard solid microprocessor-based control system for the elevator as required to provide automatic operation. Controllers shall be mounted on the hydraulic pumping units, unless otherwise approved by the Architect.

Microprocessor based control system shall perform the functions of safe elevator motion, car operational and supervisory control and elevator door control. The system shall allow for reprogramming of software to suit the individual requirements and changing operational requirements of the facility, based upon the parameters of the operational system(s) specified. Across the line starting is not acceptable.

A. The system shall include the hardware required to connect, transfer and interrupt power, and protect the motor against overloading, and perform operation control.

B. The controller cabinet containing memory equipment shall be properly shielded, control shall accept reprogramming with minimum system down time, and shall not lose memory from a power failure.

C. Equipment Enclosures: Install control system in cabinets of steel with hinged doors or panels arranged for easy removal, of required gauge and properly grounded as required by National Electrical Code. Rack mount equipment to permit easy access to components. Provide doors with recessed ring-pulls or handles and ventilation grill at top and bottom.

D. Provide Battery Lowering Operation to lower elevator and open doors at the designated landing in the event of main power failure as per Code.

2.6 NORMAL STOPPING DEVICES AND FINAL LIMIT SWITCHES (NEW)

A. Provide slow-down and normal stopping devices.

B. In addition to the normal limit stops, a hoistway final limit switch shall be installed at the top and at the bottom of each hoistway.

2.7 AUTOMATIC TWO-WAY LEVELING (NEW)

A. Elevator car shall have two-way leveling to automatically bring the car to a stop approximately level with any floor for which a stop has been initiated, regardless of load, rope stretch or direction of travel. Maximum level variation ¼".

B. Automatic leveling control shall permit the synchronization of door opening with the stopping of the car at a floor.

2.8 GUIDE RAILS (REUSE)

A. Realign rails and file joints as required to provide a smooth ride.

2.9 HYDRAULIC JACK ASSEMBLIES/CYLINDERS/PLUNGER COMPLETE:

A. Provide a new Twin post hydraulic jack packing assembly for elevator.

2.10 HYDRAULIC CYLINDERS/PLUNGERS

A. Remove the existing plunger and cap off hole.

2.11 CAR BUFFERS (NEW)

A. New buffer springs, pit buffer channels and paint. Anchor as required to provide a solid assembly.

2.12 PIT SWITCH AND PIT LADDERS (NEW)

A. New emergency stop switches shall be in the elevator pits as per code.

B. Install new pit ladder to be accessible from the pit access door, extending a minimum of 48” above the sill of the access door, as per Code.

2.13 HOISTWAY DOOR INTERLOCKS (NEW)

A. Each elevator hoistway door shall be equipped with a hoistway unit system, hoistway door interlock. The interlock shall prevent the operation of the elevator machine by the normal operating device unless the hoistway door is locked in the closed position. The interlocks shall also prevent the opening of a hoistway door from the landing side unless the car is at the landing.

2.14 HOISTWAY DOOR UNLOCKING DEVICES (NEW)

A. Unlocking devices shall be provided at all floors as per Code for all elevators. Provide any missing escutcheons.

2.15 ELEVATOR CAR SPEED

A. Provide a minimum elevator car speed of 150 fpm.

2.16 ELECTRICAL WIRING (NEW)

A. Electrical wiring shall comply with the ASME and National Electrical Code and all local codes. Wiring shall be included for all devices installed.
1. Furnish and install complete insulated wiring to connect all parts of the equipment. Properly ground all components as required by the National Electric Code.
2. Insulated wiring shall have a flame retarding and moisture resisting outer cover and shall be run in a metal conduit, metallic tubing, or wire ducts.

3. Provide 6 percent spare wires between each controller, hoistway junction box and control panels, also 6 percent spare conductors in each trail cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.
4. Tag code all field wiring at junction points; control wiring in traveling cables at their terminals in the machine room; elevator car junction box and connections within the car. Test entire wiring system for insulation to ground.
5. Flexible liquid tight conduit is to be used unless conditions dictate otherwise.

2.17 GUARDS

A. Provide as applicable to the ASME A17.1Code, relative to guarding of exposed gears, sprockets, tape or rope sheaves, or drives of selectors, floor controllers, or signal machines, and the ropes, chains, or tapes for driving same in machine room. Provide a toe guard to comply with NCDOL requirements.

2.18 TOP OF CAR OPERATING DEVICE (NEW)

A. Each elevator shall be provided with an operating device mounted from or on the car crosshead which will permit slow speed (150 fpm or less) operation for purposes of adjustment, inspection, maintenance, and repair. A transfer switch shall be provided in the top of the car operating device fixture which will permit the disconnecting of hoistway access switch or switches and render top of car operating device operative. The operating device shall be mounted in a metal box and shall be rigidly secured in a position conveniently accessible to workmen on top of the car.

Provide car top escape hatch electrical switches as per Code. All car top boxes must be NEMA 4 rated. Electric light with wire guard and GFI convenience outlet fixture on car top which shall meet the requirements of ASME A17.1, Rule 204.7a(4).

2.19 LUBRICATION

A. Suitable means shall be provided for lubrication with oil or grease, all bearing surfaces in connection with the elevator installation. Greased gun fittings, if used, shall be suitable for high pressure guns. Greased guns, if used, shall be automatic feed compression type.

2.20 HOISTWAY ACCESS SWITCHES (NEW)

A. Provide hoistway access switches at the top and bottom terminal landings, as per Code.

2.21 PLATFORM AND CAR FRAME

A. The platform and car frame shall be new.

B. All retained equipment shall be inspected and renewed as needed in order to render the elevator to provide an acceptable operation.

2.22 CAR ROLLER GUIDES (NEW)

A. Clean car guide rails and provide roller guides, spring loaded type, which are individually adjustable.

2.23 CAR DOOR HANGERS AND TRACKS (NEW)

A. Complete door hangers and tracks shall be provided for the car doors. Sheaves shall be steel with a flanged groove into which a solid non-metallic tire shall be vulcanized securely. Sheaves shall be a minimum of 2 1/2" diameter. Hangar brackets shall be the applied type.

2.24 DOOR OPERATORS (NEW)

A. Provide new master door operator with the "closed loop" feature, capable of opening doors at not less than 1 ½ fps and accomplishing reversal in 2 ½ inch maximum of door movement on passenger elevator. Doors shall open automatically when a car arrives at floor to permit transfer of passengers; after timed interval, doors shall automatically close. Arrange operator so doors can be opened by hand from inside the car in case of power failure if cars are within the leveling zone. **Provide NEMA 4 enclosed door operator.**

2.25 DOOR RE-OPENING AND CONTROL DEVICES (NEW)

A. Provide 3D solid state door reopening device per code and to comply with AMSE A17.1-2019.

2.26 HOISTWAY ENTRANCES (REUSE), HOISTWAY DOORS (NEW)

A. Retain the existing hoistway entrance frames clad with stainless steel and provide new hoistway stainless doors at all openings. Provide new door hangers, rollers, tracks, closers and bottom gibs. Provide missing door escutcheons on all hoistway doors.

B. New hanger sheaves shall be steel with a flanged groove into which a solid non-metallic tire shall be vulcanized securely. Sheaves shall be a minimum 2 ½" diameter. Bearings for sheaves and rollers shall be ball type, sealed to retain grease lubrication. Hanger brackets shall be the applied type. Steel housing shall be provided for attachment to the door. Rollers, with ball-bearings, shall be provided to remove excessive door up-thrust.

C. Floor Numbers: Provide floor numbers on the hoistway side of the door panels in compliance with ASME A17.1.

D. Provide restricted opening of all hoistway doors and/or car doors of the passenger elevators in compliance with ASME A17.1 code and supplements.

2.27 CAR ENCLOSURE

A. Shall be retained and refurbished as per Plans.

2.28 SIGNAL FIXTURES (NEW)

A. All signal fixtures provided as part of this specification shall be vandal resistant type, stainless steel, illumination, and all cover plates shall be secured using tamper-poof fasteners. The finish for all cover plates shall be #4 brushed stainless steel. **(Provide NEMA 4X fixtures for all locations.**

All signal fixtures described hereafter and provided, shall be fully compliant, and installed in accordance, with all the current rules and regulations of ASME A17.1 and ADAAG and the North Carolina State Accessibility Code. All applicable signage shall be engraved on car and hall button fixtures.

This shall include, but not limited to, Phase I and II operating instructions and lobby exit signage.

B. Provide new car-operating panel. Panel shall contain all the necessary buttons, indicators, audio and visual signals and keys switches for Firefighters Phase I and II and all controller features activated by the car-operating panel. It shall be hinged for easy access and maintenance to the components. Emergency lighting fixture shall be installed above the new car operating panel or may be incorporated in the new panel. The necessary telephone hookup shall be provided in the machine room and routed to the car telephone.

C. New hall push button fixtures shall be vandal resistant, stainless-steel type with engraved signage: “In Case of Fire Use Exit Stairs”, or similar wording with Fire Sign. Fixtures shall be the flush mounted at proper height as per code. New vandal resistant combination hall lanterns, position indicators, direction arrows shall be provided at each floor. New fixtures shall cover existing fixture holes and included neoprene gaskets. The Designated level is the first floor and Alternate landing is the basement floor, or as determined by the AHJ.

D. New digital car position indicators and direction arrows shall be provided and incorporated in the new car-operating panel.

E. Provide Emergency power status indicator jewel at designated landing, as per Code.

2.29 OPERATION AND CONTROL SYSTEM

A. Manufacturer is to provide, and contractor is to install built-in diagnostics for trouble shooting system.

B. Operation: Provide controller manufacturers standard single car selective collective operation.

C Independent service: A key-operated switch shall be provided for each elevator for selecting independent service operation. When this switch is in the independent service position, the elevator shall be disconnected from the selective-collective control system and all hall calls will be transferred to the other car. The elevator taken out of service may then be run from its car buttons for any special usage.

2.30 AUXILARY OPERATION AND CONTROLS

A. General: In addition to primary control system features, provide the following controls or operational features for the passenger elevator, except where otherwise indicated.

B. Provide Fire Fighters Service Phase I and Phase II in accordance with ASME A17.1 Code and all local governing codes. A three-position key-operated switch marked “ON, OFF, RESET” shall be provided at the designated landing.

C. Alarm Bell System (With Electrical Power to Car): Emergency alarm bell(s) shall be located so as to be heard outside the hoistway and arranged to sound automatically in response to

activation of alarm button in car control system. Emergency Lighting and Alarm Bell: Provide new lighting and alarm bell. Emergency lighting may be incorporated in the car operating panel.

D. Elevator Emergency Power Selector Switches:

E. Elevator Battery Lowering Operation: Elevator to lower elevator(s) to the Designated Landing in case of a main power failure. Operation shall be designed to function as per Code.

2.31 MACHINE ROOM EQUIPMENT

A. Identification: Provide identifying numbers on the pumping unit, controller and disconnect switch and data tags as per code.

B. No conduit shall be fastened to or supported by the controller frame or other machinery except by flexible connections.

2.32 HEAT SENSOR TIE-IN

A. System to interface with elevator lobby heat sensors, including designated and alternate level and machine room (heat sensors and wiring to Machine Room by others).

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation shall meet applicable requirements of the latest edition of the ASME A17.1 Code, Sections 8.6 and 8.7

B. Welding procedures and the appearance and quality of welds shall Conform to the American Welding Society (AWS) Code.

3.2 HOISTWAYS

A. All hoistway equipment shall be cleaned and painted. All conduit, duct or equipment abandoned or rendered useless by modernization shall be removed and disposed of.

3.3 PAINTING OF ELEVATOR EQUIPMENT

A. All elevator equipment, miscellaneous iron and steel work located within the machine room, pit and hoistway, including elevator machines, motors, controllers, sheaves, door operators, car frames and platform, pit equipment and exteriors of elevator cars, hoistway facias, hanger covers and toe guards shall be painted. All painting shall be by Elevator Contractor.

B. Finish coats shall have hard, tough semi-gloss or matte surfaces. Prime coat shall be compatible with finish coats. Any visible equipment in hoistway shall be painted matte black except hoistway conduit and duct.

C. Machine room floors, pit and top of cars shall be painted medium gray as required in paragraph B, above.

D. If items are factory painted, they are not required to be completely repainted, but touched-up to present a new appearance.

3.4 USE OF ELEVATORS

A. The elevator contractor shall provide protection from hoistway in accordance with ASME A17.1 Code.

B. The guarantee period will start at the time the elevators are completed and accepted.

3.5 TESTING

A. Tests shall be performed by the Elevator Contractor at his expense in the presence of the Owner, Architect, or their designated representative. The elevators shall be subjected to the following acceptance and inspection and tests:

1. Inspection and test required by applicable portions of the ASME A17.1 Code and all current supplements.
2. Periodic inspection and tests as required by applicable portions of the ASME A17.1 Code and all current supplements.
3. Inspection and tests required by Federal, State and Local codes and ordinances.
4. A continuous operating test in which the elevator under full rated load is operated continuously for one (1) hour over its entire operating range, stopping momentarily at all floors. There shall be no operational failure of any component.
5. Test safety circuit and door lock circuit for proper operation.
6. The Contractor shall also present certified copies of the results of tests required by the ASME Code.
7. Test Results: In all test conditions, speed and performance time specified shall be met. Leveling accuracy shall be maintained without re- leveling. General riding quality shall be acceptable to owner. Temporary rise in windings shall not exceed 50 degrees Celsius above ambient.
8. Contractor shall provide Owner/Representatives a minimum of eight (8) hours training on the new elevators controls, operation, drive systems and complete elevator system at the end of the project. Owner shall set time and date for this training.

B. Emergency Systems Testing:

1. The elevator contractor shall participate in the building fire alarm testing. The following features are to be demonstrated:

   Recall (fire alarm): Demonstrate the elevators ability to accept a signal (contact closure from the fire alarm system) and initiate the following sequence:

   1. A contact closure shall be provided to the elevator controls for the elevators serving the lobby of incidence, shall automatically return to their designated floor where they shall park with their doors open.

2. If the fire floor of incidence is the designated floor, the elevator cab(s) shall return automatically to an alternate floor.

C. Final Adjusting/Setup

1. The final adjusting/setup to the elevator controllers shall be performed by an experienced factory trained adjuster, who is an employee of the elevator controller manufacturer.

2. Upon completion of the final adjusting/setup, this work shall be certified from the manufacturer that the elevator controllers are operating in accordance with the design specifications.

3. Provide a data plate that indicates the Code and edition in effect at the time of the Alteration. Data plate shall be in plain view, securely attached to the main line disconnect or on the controller.

3.6 ACCEPTANCE

A. Final acceptance of the installation shall be made after all field quality control inspections and tests are complete. Workmanship and equipment must comply with specification. Speed, floor to floor performance, accelerating, decelerating, running, and leveling must comply with specification. Elevator contractor shall furnish personnel, equipment, and instruments to perform all required tests.

END OF SECTION 142110

SECTION 142110 –HYDRAULIC ELEVATOR

PART 1 – GENERAL

1.1 SCOPE

A. Modernize One (1) passenger elevator with a rated load of 2,500 pounds, to be Single Selective Collective Operation, Speed 150 fpm. Serving floors 1 and 2, two (2) landings. State ID# 18837

It is the purpose of this specification to include all labor, material, tools, rigging and equipment necessary to:

1. Modernize passenger elevator complete in every respect, make code and ADA required changes, and meet the requirements as indicated and/or specified. The elevators are located at Roanoke Island Aquarium, Mateo, NC.
2. Coordinate the work of this Section with the work of other Sections as required to properly execute the work as necessary to maintain satisfactory progress of the work of other Sections.
3. The alterations of the elevators must be properly coordinated so that the building will not be without elevator service at any time. Schedule the removal of elevator from service with the Owners representative.
4. If these specifications are not complete as to any minor detail of a required feature, or with regards to the manner of combining or installing parts, material, or equipment, but there exists an acceptable trade standard for good and workmanlike practices, such detail shall be deemed by implication to have been required by these specifications in accordance with such standard.
5. Any component listed as remaining existing in this document must be fully inspected by the contractor to meet current Code requirements. Any repairs or refurbishment of retained devices or components is to be included in Contractor's Base bid.

B. This specification is intended to cover the alterations/ modernization as shown on the plans and specified hereinafter.

C. The major elevator components shall be the products of one manufacturer of established reputation, except they may be the products, either wholly or in part, of another manufacturer if of established reputation provided such items are engineered and produced under coordinated specifications. Any contractor who proposes to install any "major elevator component" not manufactured or normally assembled by him, as part of his equipment, shall have such product approved by the North Carolina Department of Labor, Elevator Bureau, prior to bidding this specification. Also, the major components to be furnished shall be of a make or makes that have performed satisfactorily together under conditions of normal use in not less than twenty-five (25) other elevator installations of equal or greater capacity and speed for a minimum of three (3) installations in North Carolina.

Upon request, the names and addresses of the building and the names of the owners and manager thereof, in which the proposed combination of major components has so performed shall be furnished.

1. The term "major elevator components" as mentioned above shall mean such items as the hydraulic pumping units, pumps, motors, valve(s), jack assembly, controllers, door operators, and related equipment.
2. The major components shall be installed and so arranged that parts can be removed for repairs or replacement by conventional means, without dismantling or removing other

equipment and components. Sufficient workspace for maintenance and repair operations shall be provided around the elevator equipment in the machine room with clear passage to any access or trap doors.

1.2 REFERENCES

A. Comply with applicable building codes and elevator codes at the project site, including but not limited to the following:
   1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by NCDOL.
   2. ASME/NFPA 70 National Electrical Code.
   3. ASME/NFPA 80 Fire Doors and Windows.
   4. Americans with Disabilities Act – Accessibility Guidelines (ADAAG).
   5. AMSE/A17.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
   6. ASME/UL 10B and ASTM E152, Fire tests of door assemblies.
   7. Model building codes.
   8. All other local or applicable codes.

B. Make application for, secure and pay for all necessary permits and certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities. Furnish the Owner certificates and approval as required by the local governing authorities having jurisdiction.

C. In addition to the permits, inspections and test specified and the governing codes, the elevator contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense.

D. Any damage of any kind to the car or the adjoining structure which may develop through performance of any tests shall be repaired at no additional costs to the Owner.

1.3 RELATED WORK OF OTHER SECTIONS

A. Required Work by Elevator Contractor as part of the base bid:

   a. Cleaning and painting of hoistway equipment and other equipment as indicated in the specifications. Provide (2) coats of ASTM B117 rated primer, (2) coats ASTM B117 paint to all steel surfaces in the hoistway. This is including but not limited to hoistway beams, angles, channels, and all steel elevator components.
   b. Replace existing pit access ladder, as per code requirements. Paint ladder two coats with semi-gloss enamel paint. Provide non-slip ladder rungs, applied tape is not acceptable.
   c. Paint hoistway facias, door hanger covers and car toe guards. Paint both sides of the door hanger cover’s which are visible from the landing side of the entrances. Existing door hanger covers shall be reused, cleaned, and painted.
   d. Pipe and wire the existing car telephone circuits to the elevator controllers.
   e. New car communication (telephone) shall be provided and installed as part of the new car operating panel, as per code AMSE A17.1-2019 requirements of voice, text and video.
   f. Obtain approval prior to bid if the new elevator hydraulic pump motor exceeds a 20 H.P. rating. Electrical feeders are designed to accommodate up to a 20 H.P. rating.

g. Replace all existing electrical wiring, traveling cables, conduit, duct, junction boxes and fittings in the elevator hoistway. Travel cables shall be routes from the car to the controller without splices.
h. Route all hoistway wiring, such as hall position indicators, hall push button fixtures, hoistway interlocks, limit switches, etc., in liquid tight flexible nonmetallic conduit.
i. Route all wiring on the car top in liquid tight flexible metal conduit or metal conduit.
j. All connectors used for metal conduit shall be compression type. Screw type connectors are not permitted.
k. All fastening hardware to be used for installation is to be #316 stainless.
l. Remove any elevator conduit from behind the pit ladder and reroute.
m. Fire caulking as required in the hoist-ways.

B. Site Visit and Inspection of Existing Equipment:
1. By submitting a bid, Contractor certifies that he has visited and inspected the site and existing facilities and has informed himself in detail as to all existing conditions that may affect the work. Failure to do so will not be considered sufficient justification for additional compensation and/or extension of contract time.
2. For access to the building, arrangements must be made through the Architect and Owner.

1.4 SUBMITTALS

A. Shop Drawings, Descriptive Data: Submit samples of all natural metal finishes for approval. Submit accurately dimensioned drawings prepared for this project detailing all fabrication of custom assemblies and layouts of standard items. Shop drawings shall include but not be limited to the following:

1. Dimensioned Layouts: Controller location in machine room.
2. Design Information: Indicate equipment lists and design information on layouts.
3. Design of car enclosure, showing elevations and details.
4. Power Confirmation Sheets: Include KVA, starting current, full load running current and demand factor for applicable static control devices.
5. Certificates: Submit certificate of elevator performance with contract closure documents. After adjustment tests and inspection are performed, forward certificate signed by elevator manufacturer stating that the equipment and controls provide elevator service as specified.

6. Information for Operation and Maintenance:
a. Three (3) sets of wiring diagrams with field changes.
b. Three (3) sets of parts manuals for all components.
c. Three (3) sets of trouble shooting manuals.

These shall include:
a. Description of the elevator system's sequence of operation and control including the functions of signals, door devices and other features. Provide any special tools needed to maintain or trouble shoot equipment.
b. Written instructions for the trouble shooting adjustment and care of the entire equipment.
c. Electrical prints shall be reproducible type, non-fading.
d. One set shall be sealed in a clear material and mounted in the elevator machine room.
e. All electrical wiring diagrams shall be "as built" drawings. If standard drawings are used they shall be marked up according to the installation for which they apply.

f. Provide two sets of keys for every key switch applicable to the elevators, including the controller cabinets if required. Provide two (2) elevator door emergency unlocking device keys.
g. The identification label for each diagram and manual shall include the subject, building name, location, contract number, the specified state assigned elevator number to which the diagrams and manuals apply.
h. Three set of diagrams and manuals shall be delivered to the designer who will deliver them to the engineering officer of the facility and,
i. The elevator contractor shall notify the North Carolina Department of Labor for scheduling of a final inspection as per code and specifications. Approval must be given that all code requirements have been met and that installation complies with the specifications before final payment will be made.

7. Verification that manufacturer warehouses parts locally with immediate access to major components (rotating elements, etc.).
8. Provide the tool and/or diagnostic equipment and software to adjust, troubleshoot, and maintain the elevator control system. Any cost to keep tools updated and operable to be included in the base bid. Provide instruction manuals in the operation of these special tools. If a special agreement is required, provide a copy with your bid.
9. Provide signs for elevator out of service, in format approved by Owner.
10. Provide approved barricades at all openings where open hoistways are open to view.
11. Dimensioned layout of elevator machine room is not required. This layout must show all equipment in the elevator contract, as well as air units, ductwork, mechanical, electrical, and plumbing lines, structural elements and anything else which may impinge on the use of the rooms. Code required clearances must be acknowledged.
12. For each elevator, prepare and provide a written Maintenance Control Program (MCP) that complies with ASME A17.1/CSA B44 Section 8.6, including written documentation that details the test procedures for each test that is required to be performed by ASME A17.1/CSA B44. Assemble all MCP documentation, and supporting technical attachments, in a single MCP package and provide in both electronic and hard copy. Assemble entire hardcopy MCP in 3-ring binders. For each elevator provided, the MCP must include only documentation and instruction that apply to elevator specified. For each elevator, provide an additional, separate binder that includes all maintenance, repair, replacement, call back, and other records required by ASME A17.1/CSA B44. The records binder must be kept in the elevator mechanical room, maintained by elevator maintenance and service personnel, and be always available to authorized personnel. Provide detailed information regarding emergency service procedures and elevator installation company personnel contact information.

1.5 CERTIFICATIONS

A. Reports on in-place testing of elevators in conformity with Rules of the latest edition of the ASME Code and Current Supplements.

B. Material Certification: Provide written certification that materials used meet specified requirements.

C. Installation of Certification: The Elevator Contractor shall provide written certification stating that elevators are completed and operational per specifications.

1.6 PERMITS, CODE, INSPECTION CERTIFICATES

A. Make an application for secure and pay for all necessary permits and Certificates of inspection for all equipment included herein, as required by the various departments of the Local and State Authorities.

B. All work, material, fabrication, design, and equipment shall comply with the requirements, rules and latest approved practices of the National Electrical Code, latest edition of the ASME A17.1 Code, applicable requirements of Sections 8.6 and 8.7, latest edition of the ASME A17.3 Code, the Americans with Disabilities Act and the rules and regulations of all other governing bodies which may have jurisdiction where the equipment is to be installed.

C. Before final acceptance of the work, furnish the Owner certificates of inspection and approval as required by the authorities having jurisdiction. Make tests as specified and as required by the regulations and in the presence of the proper authorities or Owner's representative.

D. In addition to the permits, inspections and tests specified and the governing codes, the Elevator Contractor will be required to have performed speed and load carrying capacity and heat tests at his own expense. Elevator Contractor to participate in fire service tests to assure that equipment operates as required in emergencies.

1.7 MAINTENANCE

A. The elevator modernization contractor will assume maintenance on all elevators that are the subject of this modernization specification once on-site modernization work commences on the first elevator.

B. Modernization Maintenance Period: Maintenance service consisting of a minimum of monthly examinations, adjustments and lubrication of the elevator equipment shall be provided by the Contractor for a period of twelve (12) months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the Contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs, or replacement of parts due to negligence, misuse, abuse, or accidents caused by persons other than the Contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

C. The contractor shall provide a service manual for each elevator describing monthly, quarterly, and annual maintenance tasks. Each task shall include an area for signature by a Certified Elevator Technician upon completion of task. The service manual shall also include page/s for documenting all required inspections and tests. The service manual shall contain a section to record all related maintenance, repair, and replacement information in accordance with ASME A17.1, Part 8.6 and remain on site.

D. The contractor shall provide documentation and shall perform monthly testing of fire service recall operation as per ASME A17.1 and ASME A17.2.

E. Submit parts catalog and show evidence of local parts inventory with complete list of recommended spare parts. The manufacturer of original equipment shall produce parts.

F. The contractor shall have full-time service personnel within one (1) radius of the project site.

G. Maintenance service shall include all required tests for inspection services as required by NCDOL Elevator Bureau and ASME A17.1

1.8 WARRANTY

A. Warranty: The Elevator Contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The Contractor warrants to the Owner that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work and labor will be free from defects for the period of Twelve (12) months upon acceptance of Contractor's work by Owner, provided that manufacturer approved preventative maintenance program is in effect during the Guarantee/Warranty period, and that the Work will conform with the requirements of the Contract Documents. The Contractor's Warranty is only subject to the exclusions specified in the Contract or herein.

B. The guarantee excludes ordinary wear and tear or improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the Elevator Contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. Any defective condition or workmanship not mutually agreeable as satisfactory to building owner and Elevator Contractor shall be determined by the independent elevator consultant as final for the replacement, repair or continued use or product or part in question.

C. Contractor shall promptly correct Work rejected by the Owner or failing to conform to the requirements of the Contract Documents and shall correct any Work found to be not in accordance with the requirements of the Contract Documents within a period of one year from the date of completion of the Work.

D. In addition to Contractor's above-mentioned warranties, Contractor shall, for the benefit of the Owner, obtain and assign to Owner, if necessary, warranties from the manufacturers, producers, and suppliers whose products are incorporated into or used in the work performed hereunder. All work and materials provided pursuant to the warranties hereunder shall be performed at no charge to the Owner.

E. Contractor warrants that (a) the Work shall be completed in accordance with the Contract Documents and in compliance with all federal, state and local laws, ordinances and regulations, and (b) all materials and equipment furnished by Contractor will be of good quality and new, unless otherwise specified in the Contract Documents.

1.9 MANUFACTURER

A. The following elevator controls are accepted as equals. Equal products are accepted under the requirements of these specifications and/or pre-approved by the Owner and Architect.

Controls:
Motion Controls (MCE)
Smart Rise
Virginia Controls
GAL Controls

B. Elevator Contractor must be able to demonstrate that he has installed and maintained similar elevators to those specified and which have given satisfactory service; has been in successful operation for at least ten (10) years; maintains locally an adequate stock of parts for replacement or emergency purposes; has available qualified persons to do the work.

The controller must use non-proprietary parts.

1.10 BIDDER'S QUALIFICATIONS

1. The Bidder shall have technical qualifications of at least three years' experience and trained supervisory and installation personnel to install specified items.
2. Any manufacturer's product submitted shall have been in satisfactory and efficient operation on not less than twenty-five installations like this project, and for not less than one and one-half years.
3. The contractor shall submit a list of five (5) installations by the contractor of the control system and machine proposed for use on this project.
4. The Contractor shall have available under his direct employment and supervision the necessary personnel, organization, and facilities to properly fulfill all the service and conditions required under these specifications.
5. Contractors must have access to necessary tools, diagnostic equipment and software to maintain the solid-state controlled equipment included in the specification. Evidence of this requirement shall be submitted with the bid and shall include references from customers with full-service maintenance on solid state-controlled elevator equipment of the same make and model as bid.
6. The Bidders may be required to submit to the Owner's Representative a resume of experience of the assigned foreman and mechanics, names and addresses of persons authorized to accept or reject work performed under this contract and a financial capacity to perform this contract (Dunn Rating or equal).
7. Maintaining of this elevator equipment in a safe condition within proper operating limits in accordance with original manufacturer's equipment specifications is of paramount importance.
8. Requests for information contained in Item 4 may also occur at any other time during the effective period of this contract, or any extension/renewal thereof.

1.11 CONTRACTOR RESPONSIBILITY

A. The Contractor shall carefully review specifications and existing building conditions as they may affect the design, installation, use, and maintenance of the traction elevators. The Contractor shall submit with his bid a certificate in writing stating his acceptance of all such elements of the design. Any exceptions shall be noted on this certificate. **The cost for any changes required to produce a full, workable, code complying elevator system shall be borne by the Contractor.**

B. The electrical design for the hydraulic elevators will be based on the power feeders and disconnect devices as specified in the electrical specification sections.

C. The Elevator Contractor shall remove all superseded equipment not retained by the owner at Contractors expense. Specific items to be retained will be removed by the Elevator Contractor and delivered to the owner's choice of location. If the owner has no use for the removed items, the Elevator Contractor shall dispose of them.

D. Where access to the pit is by means of the lowest hoistway entrance, provide a vertical ladder on the interlock side of the access door extending a minimum of 48" above the sill of the access door in accordance with ASME A17.1 Code. The elevator contractor shall relocate conduit, raceways, or any other equipment that interferes with the installation or relocation of the pit ladder on the interlock side of the access door.

E. The Elevator Contractor shall coordinate their work and cooperate with the Owner and/or their contractor responsible for performing work under Article 1.3.

F. The Elevator Contractor shall be responsible for all cutting and patching required by their work. Elevator Contractor shall provide fire stops as required by code for all wiring, etc. that penetrates fire rated walls.

PART 2 – PRODUCT

2.1 Elevator equipment shall be, in general, the manufacturer's top-of-the-line products, modified as required to operate with existing components.

2.2 EQUIPMENT SCHEDULES

A. Modernization Summary for One (1) Existing Hydraulic Passenger Elevator, Roanoke Island Aquarium

Machine Room	
Complete Pumping Unit	New
Pump and Motor	New
Valves	New
Controller	New
Leveling Devices	New
Hoistway	
Hydraulic Jack Assembly	New twin post hydraulic
Normal & Final Limits	New
Hoistway Door Interlocks	New
Hoistway Closers	New
Hoistway Door Panels	New, stainless steel
Hoistway Door Hanger Covers	New
Hoistway Facias	Reuse existing, clean and paint both sides
Hoistway Door Hangers & Rollers	New
Hoistway Door Bottom Guides	New
Hoistway Door Frames	Reuse existing, clad with stainless steele
Hoistway Door Headers/Struts	New
Unlocking Devices	New
Guide Rails	Reuse existing, clean.
Buffers and Pit Channels	New
Car Frame	Reuse existing, clean and paint.
Car Enclosures	Reuse, refurbish as per plans.
Top of Car Operating Devices	New
Platform	Reuse, clean and paint
Ceiling	New per plans
Ceiling Lighting Fixtures	New
Certificate Frames	New
Emergency Lighting	New
Car Hangers and Tracks	New
Car Door	New, stainless steel

Front Return Panels, Headers & Jambs	New
Floor Covering	New per plans
Car Door and Sill	New
Communications	New
Door Operator	New, heavy duty
Door Protection	New
Signals	New, extender type. All fixtures shall be vandal resistant stainless-steel type, etched for illumination. All signage shall be engraved in the new hall and car fixtures.
Car Operating Panel	New Phase II instructions and all other required wording shall be engraved. Locate fire fighters panel as per code.
In Car Lanterns	New
Hall Push Buttons Fixtures	New, vandal resistant, stainless steel, extender type with engraved signage and fire sign. Patch and paint as required.
Hall Lanterns	New in hall call station. Remove existing and patch hole.
Car: Raised Nos. and Braille	New
Frames: Raised Nos. and Braille	New
Fireman's Service	New
Emergency Lighting	New
Maintenance Service	As per specifications
Traveling Cable	All wiring for security card reader, camera and video provided for future use. In addition to the 10% spare wires, each traveling cable shall be arranged to provide no fewer than eighteen (18) individually shielded pairs of 18-gauge twisted pair and two (2) RG-6/U solid center conductor coax cable for CCTV monitoring one (1) coaxial cable spare for future security requirements. Run one coax and power supply to location in car for CCTV camera. All cables must be separated from any high voltage. Provide a termination box to hand off travel cable wires for use by others (security, AV. Etc.) Clearly mark wires on both ends.

2.3 PERFORMANCE

A. Speed: +/- 5% under any loading condition.

B. Capacity: Safety lower, stop and hold rated load.

C. Leveling: +/- ¼" with rated load and under normal operating conditions.

D. Door Closing Time, Thrust and Kinetic Energy shall comply with ASME A17.1 Code and ADA.

2.4 POWER UNIT

A. The power unit (oil pumping and control mechanism) shall be compactly and neatly designed, with all of the components listed below combined in a self-contained unit.

B. Pump shall be especially designed and manufactured for oil hydraulic elevator service.

C. Motors shall be high starting torque, single speed, of standard manufacturer and of duty rating to comply with herein specified speed and loads.

D. New hydraulic pump incorporated in submersible pump unit.

E. Valve: The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control up and down starting, acceleration, transition from full speed, up and down stops, pressure relief and manual lowering. All these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and shut-off valve. All valves must be located as to make them readily accessible for servicing. Provisions shall be incorporated to securely lock all adjustments.

F. Tank: Provide storage tanks constructed of steel in conformance with ASME A17.1.

G. Power Controller: a power controller shall contain necessary electrical silver contactors, electro-mechanical switches, and thermal overload relays. Components shall be mounted in NEMA 1 enclosure. Logic control system shall be microprocessor based, integrated solid state circuitry. System shall be protected from environment and vibrations.

H. Piping: New, all necessary pipe and fittings to connect power unit to jack unit, and a complete charge of oil of the proper grade shall be furnished to each unit. A main line strainer and shut-off assembly of the self-cleaning type with a 60-mesh element, and a magnetic drain plug shall be furnished and installed in the oil line. The unit shall be designed for 400 psi working pressure, shall be compact in design with easy access for cleaning. Sound isolating couplings, a minimum of two, shall be installed in the oil line in machine room between pump and jack. Each Coupling shall consist of two machined flanges separated by a neoprene seal to absorb vibration and to positively prevent metal-to-metal contact in the oil line. Couplings shall be designed and manufactured in such manner that they will be absolutely blowout proof. Oil-hydraulic silencer (muffler device) shall be installed in the oil line near power unit.

I. Vibration pads shall be mounted under the power unit assembly to isolate the unit from the building structure.

J.Provide identifying numbers on power unit, controller and disconnect switch.

K. Electrical Circuit Failure Protection. The electrical control circuit shall be designed so that if a malfunction should occur, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. Power operated

doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the door open button in the car station, shall be made inoperative. The malfunction shall then be corrected, and the elevator placed back in service through the mainline disconnect switch.

2.5 MOTION/MOTOR/OPERATION CONTROLLERS (NEW) (NON-PROPRIETARY)

Microprocessor Control System: Provide manufacturer's standard solid microprocessor-based control system for the elevator as required to provide automatic operation. Controllers shall be mounted on the hydraulic pumping units, unless otherwise approved by the Architect.

Microprocessor based control system shall perform the functions of safe elevator motion, car operational and supervisory control and elevator door control. The system shall allow for reprogramming of software to suit the individual requirements and changing operational requirements of the facility, based upon the parameters of the operational system(s) specified. Across the line starting is not acceptable.

A. The system shall include the hardware required to connect, transfer and interrupt power, and protect the motor against overloading, and perform operation control.

B. The controller cabinet containing memory equipment shall be properly shielded, control shall accept reprogramming with minimum system down time, and shall not lose memory from a power failure.

C. Equipment Enclosures: Install control system in cabinets of steel with hinged doors or panels arranged for easy removal, of required gauge and properly grounded as required by National Electrical Code. Rack mount equipment to permit easy access to components. Provide doors with recessed ring-pulls or handles and ventilation grill at top and bottom.

D. Provide Battery Lowering Operation to lower elevator and open doors at the designated landing in the event of main power failure as per Code.

2.6 NORMAL STOPPING DEVICES AND FINAL LIMIT SWITCHES (NEW)

A. Provide slow-down and normal stopping devices.

B. In addition to the normal limit stops, a hoistway final limit switch shall be installed at the top and at the bottom of each hoistway.

2.7 AUTOMATIC TWO-WAY LEVELING (NEW)

A. Elevator car shall have two-way leveling to automatically bring the car to a stop approximately level with any floor for which a stop has been initiated, regardless of load, rope stretch or direction of travel. Maximum level variation ¼".

B. Automatic leveling control shall permit the synchronization of door opening with the stopping of the car at a floor.

2.8 GUIDE RAILS (REUSE)

A. Realign rails and file joints as required to provide a smooth ride.

2.9 HYDRAULIC JACK ASSEMBLIES/CYLINDERS/PLUNGER COMPLETE:

A. Provide a new Twin post hydraulic jack packing assembly for elevator

2.10 HYDRAULIC CYLINDERS/PLUNGERS

A. Remove the existing plunger and cap off hole.

2.11 CAR BUFFERS (NEW)

A. New buffer springs, pit buffer channels and paint. Anchor as required to provide a solid assembly.

2.12 PIT SWITCH AND PIT LADDERS (NEW)

A. New emergency stop switches shall be in the elevator pits as per code.

B. Install new pit ladder to be accessible from the pit access door, extending a minimum of 48” above the sill of the access door, as per Code.

2.13 HOISTWAY DOOR INTERLOCKS (NEW)

A. Each elevator hoistway door shall be equipped with a hoistway unit system, hoistway door interlock. The interlock shall prevent the operation of the elevator machine by the normal operating device unless the hoistway door is locked in the closed position. The interlocks shall also prevent the opening of a hoistway door from the landing side unless the car is at the landing.

2.14 HOISTWAY DOOR UNLOCKING DEVICES (NEW)

A. Unlocking devices shall be provided at all floors as per Code for all elevators. Provide any missing escutcheons.

2.15 ELEVATOR CAR SPEED

A. Provide a minimum elevator car speed of 150 fpm.

2.16 ELECTRICAL WIRING (NEW)

A. Electrical wiring shall comply with the ASME and National Electrical Code and all local codes. Wiring shall be included for all devices installed.
1. Furnish and install complete insulated wiring to connect all parts of the equipment. Properly ground all components as required by the National Electric Code.
2. Insulated wiring shall have a flame retarding and moisture resisting outer cover and shall be run in a metal conduit, metallic tubing, or wire ducts.
3. Provide 6 percent spare wires between each controller, hoistway junction box and control panels, also 6 percent spare conductors in each trail cable; all spares shall be properly tagged or otherwise identified with clear and indelible markings.

4. Tag code all field wiring at junction points; control wiring in traveling cables at their terminals in the machine room; elevator car junction box and connections within the car. Test entire wiring system for insulation to ground.
5. Flexible liquid tight conduit is to be used unless conditions dictate otherwise.

2.17 GUARDS

A. Provide as applicable to the ASME A17.1Code, relative to guarding of exposed gears, sprockets, tape or rope sheaves, or drives of selectors, floor controllers, or signal machines, and the ropes, chains, or tapes for driving same in machine room. Provide a toe guard to comply with NCDOL requirements.

2.18 TOP OF CAR OPERATING DEVICE (NEW)

A. Each elevator shall be provided with an operating device mounted from or on the car crosshead which will permit slow speed (150 fpm or less) operation for purposes of adjustment, inspection, maintenance, and repair. A transfer switch shall be provided in the top of the car operating device fixture which will permit the disconnecting of hoistway access switch or switches and render top of car operating device operative. The operating device shall be mounted in a metal box and shall be rigidly secured in a position conveniently accessible to workmen on top of the car.

Provide car top escape hatch electrical switches as per Code. All car top boxes must be NEMA 3R or NEMA 4 rated. Electric light with wire guard and GFI convenience outlet fixture on car top which shall meet the requirements of ASME A17.1, Rule 204.7a(4).

2.19 LUBRICATION

A. Suitable means shall be provided for lubrication with oil or grease, all bearing surfaces in connection with the elevator installation. Greased gun fittings, if used, shall be suitable for high pressure guns. Greased guns, if used, shall be automatic feed compression type.

2.20 HOISTWAY ACCESS SWITCHES (NEW)

A. Provide hoistway access switches at the top and bottom terminal landings, as per Code.

2.21 PLATFORM AND CAR FRAME

A. The platform and car frame shall be new.

B. All retained equipment shall be inspected and renewed as needed in order to render the elevator to provide an acceptable operation.

2.22 CAR ROLLER GUIDES (NEW)

A. Clean car guide rails and provide roller guides, spring loaded type, which are individually adjustable.

2.23 CAR DOOR HANGERS AND TRACKS (NEW)

A. Complete door hangers and tracks shall be provided for the car doors. Sheaves shall be steel with a flanged groove into which a solid non-metallic tire shall be vulcanized securely. Sheaves shall be a minimum of 2 1/2" diameter. Hangar brackets shall be the applied type.

2.24 DOOR OPERATORS (NEW)

A. Provide new master door operator with the "closed loop" feature, capable of opening doors at not less than 1 ½ fps and accomplishing reversal in 2 ½ inch maximum of door movement on passenger elevator. Doors shall open automatically when a car arrives at floor to permit transfer of passengers; after timed interval, doors shall automatically close. Arrange operator so doors can be opened by hand from inside the car in case of power failure if cars are within the leveling zone. **(BID ALTERNATE) Provide NEMA 4 enclosed door operator.**

2.25 DOOR RE-OPENING AND CONTROL DEVICES (NEW)

A. Provide 3D solid state door reopening device per code and to comply with AMSE A17.1-2019.

2.26 HOISTWAY ENTRANCES (REUSE), HOISTWAY DOORS (NEW)

A. Retain the existing hoistway entrance frames clad with stainless steel and provide new hoistway stainless doors at all openings. Provide new door hangers, rollers, tracks, closers and bottom gibs. Provide missing door escutcheons on all hoistway doors.

B. New hanger sheaves shall be steel with a flanged groove into which a solid non-metallic tire shall be vulcanized securely. Sheaves shall be a minimum 2 ½" diameter. Bearings for sheaves and rollers shall be ball type, sealed to retain grease lubrication. Hanger brackets shall be the applied type. Steel housing shall be provided for attachment to the door. Rollers, with ball-bearings, shall be provided to remove excessive door up-thrust.

C. Floor Numbers: Provide floor numbers on the hoistway side of the door panels in compliance with ASME A17.1.

D. Provide restricted opening of all hoistway doors and/or car doors of the passenger elevators in compliance with ASME A17.1 code and supplements.

2.27 CAR ENCLOSURE

A. Shall be retained and refurbished as per Plans.

2.28 SIGNAL FIXTURES (NEW)

A. All signal fixtures provided as part of this specification shall be vandal resistant type, stainless steel, illumination, and all cover plates shall be secured using tamper-poof fasteners. The finish for all cover plates shall be #4 brushed stainless steel. **(BID ALTERNATE) Provide NEMA 4X fixtures for all locations.**

All signal fixtures described hereafter and provided, shall be fully compliant, and installed in accordance, with all the current rules and regulations of ASME A17.1 and ADAAG and the

North Carolina State Accessibility Code. All applicable signage shall be engraved on car and hall button fixtures.

This shall include, but not limited to, Phase I and II operating instructions and lobby exit signage.

B. Provide new car-operating panel. Panel shall contain all the necessary buttons, indicators, audio and visual signals and keys switches for Firefighters Phase I and II and all controller features activated by the car-operating panel. It shall be hinged for easy access and maintenance to the components. Emergency lighting fixture shall be installed above the new car operating panel or may be incorporated in the new panel. The necessary telephone hookup shall be provided in the machine room and routed to the car telephone.

C. New hall push button fixtures shall be vandal resistant, stainless-steel type with engraved signage: “In Case of Fire Use Exit Stairs”, or similar wording with Fire Sign. Fixtures shall be the flush mounted at proper height as per code. New vandal resistant combination hall lanterns, position indicators, direction arrows shall be provided at each floor. New fixtures shall cover existing fixture holes and included neoprene gaskets. The Designated level is the first floor and Alternate landing is the basement floor, or as determined by the AHJ.

D. New digital car position indicators and direction arrows shall be provided and incorporated in the new car-operating panel.

E. Provide Emergency power status indicator jewel at designated landing, as per Code.

2.29 OPERATION AND CONTROL SYSTEM

A. Manufacturer is to provide, and contractor is to install built-in diagnostics for trouble shooting system.

B. Operation: Provide controller manufacturers standard single car selective collective operation.

C Independent service: A key-operated switch shall be provided for each elevator for selecting independent service operation. When this switch is in the independent service position, the elevator shall be disconnected from the selective-collective control system and all hall calls will be transferred to the other car. The elevator taken out of service may then be run from its car buttons for any special usage.

2.30 AUXILARY OPERATION AND CONTROLS

A. General: In addition to primary control system features, provide the following controls or operational features for the passenger elevator, except where otherwise indicated.

B. Provide Fire Fighters Service Phase I and Phase II in accordance with ASME A17.1 Code and all local governing codes. A three-position key-operated switch marked “ON, OFF, RESET” shall be provided at the designated landing.

C. Alarm Bell System (With Electrical Power to Car): Emergency alarm bell(s) shall be located so as to be heard outside the hoistway and arranged to sound automatically in response to activation of alarm button in car control system. Emergency Lighting and Alarm Bell:

Provide new lighting and alarm bell. Emergency lighting may be incorporated in the car operating panel.

D. Stand-by Emergency Power Operation: Required for elevator car lights by electrical contractor.

E. Elevator Emergency Power Selector Switches:

F. Elevator Battery Lowering Operation: Elevator to lower elevator(s) to the Designated Landing in case of a main power failure. Operation shall be designed to function as per Code.

2.31 MACHINE ROOM EQUIPMENT

A. Identification: Provide identifying numbers on the pumping unit, controller and disconnect switch and data tags as per code.

B. No conduit shall be fastened to or supported by the controller frame or other machinery except by flexible connections.

2.32 HEAT SENSOR TIE-IN

A. System to interface with elevator lobby heat sensors, including designated and alternate level and machine room (heat sensors and wiring to Machine Room by others).

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation shall meet applicable requirements of the latest edition of the ASME A17.1 Code, Sections 8.6 and 8.7

B. Welding procedures and the appearance and quality of welds shall Conform to the American Welding Society (AWS) Code.

3.2 HOISTWAYS

A. All hoistway equipment shall be cleaned and painted. All conduit, duct or equipment abandoned or rendered useless by modernization shall be removed and disposed of.

3.3 PAINTING OF ELEVATOR EQUIPMENT

A. All elevator equipment, miscellaneous iron and steel work located within the machine room, pit and hoistway, including elevator machines, motors, controllers, sheaves, door operators, car frames and platform, pit equipment and exteriors of elevator cars, hoistway facias, hanger covers and toe guards shall be painted. All painting shall be by Elevator Contractor.

B. Finish coats shall have hard, tough semi-gloss or matte surfaces. Prime coat shall be compatible with finish coats. Any visible equipment in hoistway shall be painted matte black except hoistway conduit and duct.

C. Machine room floors, pit and top of cars shall be painted medium gray as required in paragraph B, above.

D. If items are factory painted, they are not required to be completely repainted, but touched-up to present a new appearance.

3.4 USE OF ELEVATORS

A. The elevator contractor shall provide protection from hoistway in accordance with ASME A17.1 Code.

B. The guarantee period will start at the time the elevators are completed and accepted.

3.5 TESTING

A. Tests shall be performed by the Elevator Contractor at his expense in the presence of the Owner, Architect, or their designated representative. The elevators shall be subjected to the following acceptance and inspection and tests:

1. Inspection and test required by applicable portions of the ASME A17.1 Code and all current supplements.
2. Periodic inspection and tests as required by applicable portions of the ASME A17.1 Code and all current supplements.
3. Inspection and tests required by Federal, State and Local codes and ordinances.
4. A continuous operating test in which the elevator under full rated load is operated continuously for one (1) hour over its entire operating range, stopping momentarily at all floors. There shall be no operational failure of any component.
5. Test safety circuit and door lock circuit for proper operation.
6. The Contractor shall also present certified copies of the results of tests required by the ASME Code.
7. Test Results: In all test conditions, speed and performance time specified shall be met. Leveling accuracy shall be maintained without re- leveling. General riding quality shall be acceptable to owner. Temporary rise in windings shall not exceed 50 degrees Celsius above ambient.
8. Contractor shall provide Owner/Representatives a minimum of eight (8) hours training on the new elevators controls, operation, drive systems and complete elevator system at the end of the project. Owner shall set time and date for this training.

B. Emergency Systems Testing:

1. The elevator contractor shall participate in the building fire alarm testing. The following features are to be demonstrated:

   Recall (fire alarm): Demonstrate the elevators ability to accept a signal (contact closure from the fire alarm system) and initiate the following sequence:

   1. A contact closure shall be provided to the elevator controls for the elevators serving the lobby of incidence, shall automatically return to their designated floor where they shall park with their doors open.

2. If the fire floor of incidence is the designated floor, the elevator cab(s) shall return automatically to an alternate floor.

C. Final Adjusting/Setup

1. The final adjusting/setup to the elevator controllers shall be performed by an experienced factory trained adjuster, who is an employee of the elevator controller manufacturer.

2. Upon completion of the final adjusting/setup, this work shall be certified from the manufacturer that the elevator controllers are operating in accordance with the design specifications.

3. Provide a data plate that indicates the Code and edition in effect at the time of the Alteration. Data plate shall be in plain view, securely attached to the main line disconnect or on the controller.

3.6 ACCEPTANCE

A. Final acceptance of the installation shall be made after all field quality control inspections and tests are complete. Workmanship and equipment must comply with specification. Speed, floor to floor performance, accelerating, decelerating, running, and leveling must comply with specification. Elevator contractor shall furnish personnel, equipment, and instruments to perform all required tests.

END OF SECTION 142110

DIVISION 22 - Plumbing

220500 Basic plumbing Requirements
221000 Plumbing Piping

SECTION 22 05 00 - BASIC PLUMBING REQUIREMENTS

PART I - GENERAL

1.1 GENERAL CONDITIONS

A. The stipulations and conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions", and "Special Conditions", hereinbefore set forth, shall apply to this and the other Sections of Division 22.

1.2 GENERAL REQUIREMENTS

A. The General Requirements hereinafter listed apply to the Plumbing Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

1.3 ALTERNATES

A. Carefully examine all alternates at the back of this specification to determine if any work described under the Plumbing Section will be affected thereby.

1.4 INTENT

A. The intent of these drawings and specifications are to describe the installation of a complete, fully adjusted and operational system. Therefore, any items shown on drawings and not specifically called for in the specifications, or any items specified and not specifically indicated or detailed on the drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Plumbing Contractor at his own expense.

1.5 DEFINITIONS

A. The Plumbing Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the plumbing systems. All items of equipment are specified in the singular; however, the Plumbing Contractor shall provide the number of items of equipment as indicated on the drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

1.6 VISIT TO THE SITE

The Plumbing Contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.

1.7 REGULATORY REQUIREMENTS

A. All work under this Section shall be accomplished in strict accordance with State codes. Where these plans and specifications conflict with such codes, the codes shall govern. The Plumbing Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.

1.8 PERMITS AND FEES

A. The Plumbing Contractor shall make all necessary arrangements, obtain all necessary approval, obtain all permits and pay fees required for the installation of any of the work covered under the Plumbing Work Division of the Specifications. Any fees required by any utility companies or municipal authorities for the final connections for these services shall be paid by the Plumbing Contractor under whose work such services appear. Before the job is certified as substantially complete, a ***Certificate of Approval*** from all authorities involved must be obtained and turned over to the Architect/Engineer.

1.9 DRAWINGS AND SPECIFICATIONS

A. The Plumbing Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between General Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Plumbing Contractor shall figure on the most expensive of the items in conflict.

B. The Plumbing Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. The Plumbing Contractor shall not under any circumstances scale drawings for the location of equipment. The Plumbing Contractor shall verify the locations of all utility services.

C. The Plumbing Contractor shall keep at least one set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

1.10 SUPERVISION

A. The Plumbing Contractor performing the work specified shall be required to employ a qualified Superintendent or Foreman to continuously supervise the installation of their work, with authorization to act as agent. Contractors: He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels, and locating chases, openings, hangers, inserts, sleeves, etc.

PART II - PRODUCTS

2.1 STANDARD PRODUCTS

A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

2.2 SUBMITTAL

A. The Plumbing Contractor shall submit, for approval, detailed shop drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Plumbing Contractor has in his possession the approved shop drawing for the particular material or equipment. The Plumbing Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.

B. Submitted material shall be properly labeled indicating specific service for which material or equipment to be used, section and article number of specifications governing, Contractor's name and name of job.

C. Approval of equipment will not relieve the Plumbing Contractor of compliance with the Specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of Submittal Data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges, and similar details with the proposed articles. The conformance with the necessary coordination between the various other Contractors and suppliers shall be solely the responsibility of the Plumbing Contractor and with no additional expense to the Owner.

2.3 SUBSTITUTIONS

A. Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown, shall be new and of the highest grade and quality and free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Plumbing Contractor shall purchase and install all materials required.

B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

C. Where a contractor makes a substitution it is their responsibility to make sure that that product meets all the requirements of the product specified and that it performs to the same standard as the specified product.

2.4 PRODUCT HANDLING

A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.

B. The Plumbing Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

2.5 MATERIALS AND WORKMANSHIP

A. The Plumbing Contractor shall perform a first class job, both in material and

workmanship. None other will be accepted. Deviations from either will be corrected by the Plumbing Contractor at the Plumbing Contractor's expense.

B. The material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.

C. Any equipment furnished by the Plumbing Contractor that is larger than those indicated on the drawings and described in these Specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

PART III - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. The Plumbing Contractor shall preform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding 4 inches in depth, wetting each layer as it is placed, and thoroughly compacting each layer with mechanical tamper or other approved means. Any damage done during excavation and backfilling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its condition prior to construction at no expense to the Owner.

3.2 SCAFFOLDING, RIGGING AND HOISTING

A. The Plumbing Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

3.3 CUTTING AND PATCHING

A. The Plumbing Contractor shall provide all cutting and patching necessary to install the work specified in this section. The patching shall match adjacent surfaces.

B. No structural member shall be cut without the approval of the Engineer, and all such cutting shall be done in a manner directed by him.

3.4 EQUIPMENT SPACE AND ARRANGEMENT

A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Plumbing Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.

B. These drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Plumbing Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after award of the contract. No departure shall be made without written approval of the Architect/Engineer.

3.5 DAMAGE TO WORK ALREADY IN PLACE

A. The Plumbing Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by mechanics skilled at their respective trades to the approval of the Architect/Engineer.

3.6 JURISDICTION OF WORK

A. It may become necessary for the Plumbing Contractor to furnish labor or materials which is not generally accepted as part of this trade. In cases of this type, he shall contract the work or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of trade agreements as to jurisdiction, alleged or actual.

3.7 COORDINATION WITH OTHER TRADES

A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Plumbing Contractor shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Plumbing Contractor shall make required changes or relocations at no additional cost to the Owner.

B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination.

C. The Plumbing Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed shall be borne by the Subcontractor or Contractors directed to do this work.

3.8 DIVISION OF WORK

A. This paragraph is intended to show exactly the point of division of work between the Electrical Division and the Plumbing Division.

B. All equipment covered in the Plumbing Division of the specifications shall be furnished, mounted, and aligned under the Plumbing Division. All individual motor starters, unless indicated as part of a motor control center, for this equipment shall be furnished and installed by the Plumbing Contractor.

C. All final electrical connections to equipment covered in the Plumbing Division of the specifications shall be completed under the Plumbing Division.

D. The Electrical Contractor shall provide a disconnect switch or junction box for each item of equipment under Division 16.

E. Electrical equipment and wiring that is provided by the Plumbing Contractor shall be in accordance with the Electrical specification.

3.9 EQUIPMENT INSTALLATION

A. Final connections to equipment, including pipe, duct, and controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.

B. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these drawings and specifications.

3.10 OPERATION AND MAINTENANCE MANUALS

A. One complete manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.

B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Section, such as "Plumbing" and the name of the Plumbing Contractor. Two copies of each approved manual shall be submitted to the Owner and one copy shall be submitted to the Architect/Engineer.

C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the Contract Documents.

D. Manuals shall include the following:

1. Complete operating installations, covering start-up and shutdown for all components installed.

2. Legible copies of all shop drawings. Any comments incorporated in "as noted" approvals of shop drawings shall be recorded on the drawings included in the manuals.

3. All equipment Maintenance and Service Manuals.

E. A complete parts list for each piece of equipment.

F. All descriptive literature for the equipment.

G. Operating characteristics, performance data, ratings, and curves for each piece of equipment.

H. Internal wiring and control diagrams.

I. All other information pertinent to the maintenance and servicing of equipment and systems provided in the project.

J. Name, address, and telephone number for service on each manufacturer's equipment.

3.11 OPERATING INSTRUCTIONS

A. After all equipment and services are in operation, and the Operation and Maintenance Manuals are available, an instruction and training session shall be conducted for the Owner's operating personnel.

B. Instruction sessions shall be conducted during the Owner's normal working periods, and at times and locations satisfactory to the Owner.

3.12 EQUIPMENT START-UP

A. No equipment shall be placed in operation until it has been inspected by a qualified representative of the manufacturer and Certified to be ready for operation. The manufacturer's representative shall supervise the start-up operation and shall be responsible for all adjustments required to meet design conditions. Such services shall be at no additional cost to the Owner.

3.13 GUARANTEE

A. The Plumbing Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

B. Any defective work, equipment, material and/or workmanship that develops within the guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Plumbing Contractor without cost to the Owner.

3.14 FINAL INSPECTION

A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Plumbing Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

3.15 FINAL PAYMENTS

A. All final payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

END OF SECTION 22 05 00

SECTION 22 10 00 - PLUMBING PIPING

RELATED DOCUMENTS:

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

PART I - GENERAL

Furnish and install a complete sanitary drain, waste and vent system as shown on the drawings and as specified herein.

No waste or vent piping buried below slab shall be smaller than 2". Make any change in flow direction or grade gradually with proper curbed fittings. Make all junctions with wye branches or wye and eighth bend. Sanitary tees may be used for vertical junctions. Size pipe per drawings.

Keep piping clean during construction. Seal all clean-outs and fixture connections. Remove all earth or foreign matter. Bed, fill and compact all line trenches according to Section 15150 or as detailed on the plans to prevent strain on joints, damage or settling.

Set all water closet fittings, floor drains, clean-outs, etc., carefully, using a spirit level. Confirm final floor elevations. The Plumbing Contractor shall have a journeyman present at all times while General Contractor is pouring concrete to insure proper installation of work in this Contract.

Install all piping with 1/4" per foot slope wherever possible but with minimum slopes as follows: 3" and less - 1/4" per foot; 4" and larger - 1/8" per foot.

PART II - MATERIAL

DRAIN, WASTE AND VENT PIPING ABOVE FLOOR SLAB:

All waste and vent piping above the floor slab shall be Schedule 40 PVC-DWV in accordance with Commercial Standards CS272-65, or CS270-65, or ASTM Standards D2665-68 or D2661-67. All plastic pipe and fittings shall bear the NSF Seal of Approval, and such other markings as required by the aforementioned standards. Fittings shall be molded, fully recessed, socket type designed for solvent welded joints. All plastic piping shall be installed and joined in strict accordance with the pipe manufacturer's instructions. Plastic waste and vent pipe shall not be used in any return air plenum unless it is fully encased in a fireproof covering or as required by any code.

TRAPS:

Provide each fixture with a trap when connection to drainage system is required. Place each trap as near to fixture as possible. No fixture shall be double trapped.

PIPE STORAGE:

If possible, pipe should be stored inside. Otherwise, store pipe on dry, level ground free from sharp objects. Protect stored pipe from ultraviolet exposure as required. Refer to manufacturer’s recommendations for rack or pallet storage and freezing temperatures.

PIPE HANGERS AND SUPPORTS:

Support Schedule 40 PVC- DWV pipe with carbon steel adjustable clevis-type hangers, 5’ o.c. with 3/8” threaded rod. Chain, strap, perforated bar, or wire hangers will not be permitted. Where required, provide suitable concrete inserts in masonry or concrete during laying or placing of those materials. Acceptable manufacturers are B-line, PHD, Gulf State Hangers, and Grinnell.

PIPE SLEEVES:

Provide pipe sleeves where all pipe passes through floors, utility platforms, walls, roofs, etc. Size sleeves for insulated pipe to accommodate both pipe and insulation. Sleeves for piping masonry or concrete walls, floors, beams, or roof, shall be of black steel pipe of standard weight, unless otherwise specified or shown. Vertical sleeves through floors shall extend at least 1" above finished floor (4” through utility platforms).

CLEAN-OUTS:

Provide clean-outs at the base of all plumbing stacks, 2'-0" above finish floor if required by local codes; at all changes in direction of all sewers; and wherever indicated on the drawings.

All cleanouts shall be as manufactured by Smith, Josam, or equal by Zurn.

FLOOR, WALL, AND CEILING PLATES:

Where pipes pass through floors, finished walls or ceilings, fit with chromium plated cast brass plates or chromium steel plates as specified hereinafter. Plates shall be large enough to completely close hole around pipes, and shall be square, octagonal , or round, with least dimension not less that 1.5 times larger than diameter of pipe. Secure plates in an approved manner. Plates shall be Beaton-Caldwell No. 3A for floor and No. 40 for walls and ceilings.

PRESSURE TESTS:

The engineer shall be notified several days before testing is to be conducted and all tests shall be conducted in presence of engineer. Prior to notifying the engineer, the Contractor shall have successfully tested the piping. The Contractor shall bear the expense of the engineer's services if the tests prove unsuccessful after the engineer has been summoned by the Contractor to observe the test.

Water test all interior soil, waste, vent, and drain piping with 10' head pressure before connecting to exterior sewers and before connecting to fixtures. Water shall remain in each system for at least 4 hours. Leaks shall be repaired and tests repeated until system fulfills this test. Systems may be tested in sections, but each joint between sections shall be tested. Do not exceed 25' head pressure on any joint.

Water test all exterior sanitary sewers with 4'-0" minimum head (above the invert) at the highest point of the sewer. Infiltration or exfiltration shall not exceed 50 gallons per inch diameter per mile per 24 hours.

Contractor shall use video camera to detect installation deficiencies such as excessive deflections, damaged pipes, leaking joints, etc. Engineer's and / or Owner's representative shall be on site to witness videotaping of all sewer piping. Contractor shall provide two (2) video tapes with corresponding diagrams for Owner's record.

END OF SECTION

DIVISION 23 - Mechanical

230500	General Provisions
230553	Mechanical Identification
238071	Air Cooled Mini-Split Sys
238073	Refrigeration Piping

SECTION 23 05 00 BASIC MECHANICAL REQUIREMENTS

PART I - GENERAL

1.1 GENERAL CONDITIONS

A. The Stipulations and Conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions", and "Special Conditions", herein before set forth, shall apply to this and the other Sections of Division 23.

1.2 GENERAL REQUIREMENTS

A. The General Requirements hereinafter listed apply to the Mechanical Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

1.3 ALTERNATES

A. Carefully examine all Alternates at the back of this Specification to determine if any work described under the Mechanical Section will be affected thereby.

1.4 INTENT

A. The intent of these Drawings and Specifications are to describe the installation of a complete, fully adjusted, and operational system. Therefore, any items shown on Drawings and not specifically called for in the Specifications, or any items specified and not specifically indicated or detailed on the Drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Mechanical Contractor at his own expense.

1.5 DEFINITIONS

A. The Mechanical Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the mechanical systems. All items of equipment are specified in the singular; however, the Mechanical Contractor shall provide the number of items of equipment as indicated on the Drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

1.6 VISIT TO THE SITE

A. The Mechanical Contractor shall visit the site before submitting his bid, so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything that could have been anticipated from a visit to the site.

1.7 REGULATORY REQUIREMENTS

A. All work under this Section shall be accomplished in strict accordance with State codes. Where these Plans and Specifications conflict with such codes, the codes shall govern. The Mechanical Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.

1.8 PERMITS AND FEES

A. The Mechanical Contractor shall make all necessary arrangements, obtain all necessary approval, obtain all permits and pay fees required for the installation of any of the work covered under the Mechanical Work Division of the Specifications. Any fees required by any utility companies or municipal authorities for the final connections for these services shall be paid by the Mechanical Contractor under whose work such services appear. Before the job is certified as substantially complete, a Certificate of Approval from all authorities involved must be obtained and turned over to the Architect/Engineer.

1.9 DRAWINGS AND SPECIFICATIONS

A. The Mechanical Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between general Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Mechanical Contractor shall figure on the most expensive of the items in conflict.

B. The Mechanical Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. No Contractor shall under any circumstances scale Drawings for the location of equipment. The Mechanical Contractor shall verify the locations of all utility services.

C. The Mechanical Contractor shall keep at least one (1) set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit drawings to Architect/Engineer before final payment is made.

1.10 SUPERVISION

A. The Mechanical Contractor performing the work specified shall be required to employ a qualified superintendent or foreman to continuously supervise the installation of their work, with authorization to act as agent Contractors. He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels and locating chases, openings, hangers, inserts, sleeves, etc.

PART II - PRODUCTS

2.1 STANDARD PRODUCTS

A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

2.2 SUBMITTAL

A. The Mechanical Contractor shall submit, for approval, detailed Shop Drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Mechanical Contractor has in his possession the

approved shop drawing for the particular material or equipment. The Mechanical Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but in no case less than six (6) copies.

B. Submitted material shall be properly labeled indicating specific Service for which material or equipment to be used, Section and Article Number of Specifications governing, Contractor's name and name of job.

C. Approval of equipment will not relieve the Mechanical Contractor of compliance with the specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of submittal data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges and similar details with the proposed articles. The conformance with the necessary coordination between the various other contractors and suppliers shall be solely the responsibility of the Mechanical Contractor and with no additional expense to the Owner.

2.3 SUBSTITUTIONS

A. Manufacturer's lists are to establish a Standard of Quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown shall be new and of the highest grade and quality. Free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Mechanical Contractor shall purchase and install all materials required.

B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

2.4 PRODUCT HANDLING

A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt, and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner

B. The Mechanical Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

2.5 MATERIALS AND WORKMANSHIP

A. The Mechanical Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Mechanical Contractor at the Mechanical Contractor's expense.

B. The material used throughout the work, except when otherwise noted, shall be new and of the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.

C. Any equipment furnished by the Mechanical Contractor that is larger than those indicated on the Drawings and described in these Specifications or have different electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

PART III - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. The Mechanical Contractor shall preform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding four (4) inches in depth, wetting each layer as it is placed, and thoroughly compacting each layer with mechanical tamper or other approved means. Any damage done during excavation and back-filling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its condition prior to construction at no expense to the Owner.

3.2 SCAFFOLDING, RIGGING AND HOISTING

A. The Mechanical Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

3.3 CUTTING AND PATCHING

A. The Mechanical Contractor shall provide all cutting and patching necessary to install the work specified in this Section. The patching shall match adjacent surfaces.

B. No Structural member shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.

3.4 EQUIPMENT SPACE AND ARRANGEMENT

A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing and maintenance. The Mechanical Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements.

B. These drawings indicate the extent and general arrangement of equipment, piping, and ductwork. If any departures are deemed necessary by the Mechanical Contractor, details of such departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after Award of Contract. No departure shall be made without written Approval of the Architect/Engineer.

3.5 DAMAGE TO WORK ALREADY IN PLACE

A. The Mechanical Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by mechanics skilled at their respective trades, to the approval of the Architect/Engineer.

3.6 JURISDICTION OF WORK

A. It may become necessary for the Mechanical Contractor to furnish labor or material which is not generally accepted as part of this trade. In cases of this type, he shall contract the work, or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of trade agreements as to jurisdiction, alleged or actual.

3.7 COORDINATION WITH OTHER TRADES

A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Contractor shall verify at the site all locations, grades, elevations, and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Mechanical Contractor shall make required changes or relocations at no additional cost to the Owner.

B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, ceiling suspension system may be installed as required for coordination.

C. The Mechanical Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed will be borne by the subcontractor or contractors directed to do this work.

3.8 DIVISION OF WORK

A. This paragraph is intended to show exactly the point of division of work between the Electrical Division and the Mechanical Division.

B. All equipment covered in the Mechanical Division of the Specifications shall be furnished, mounted and aligned under the Mechanical Division. All individual motor starters, unless indicated as part of a motor control center, for this equipment shall be furnished and installed by the Mechanical Contractor.

C. All final electrical connections to equipment covered in the Mechanical Division of the Specifications shall be completed under the Mechanical Division.

D. The Electrical Contractor shall provide a disconnect switch or junction box for each item of equipment under Division 16.

E. Electrical equipment and wiring that is provided by the Mechanical Contractor shall be in accordance with the Electrical specification.

3.9 EQUIPMENT INSTALLATION

A. Final connections to equipment, including pipe, duct, and controls, shall be provided under applicable sections of this Division, unless otherwise specified or indicated.

B. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these Drawings and Specifications.

3.10 OPERATION AND MAINTENANCE MANUALS

A. One complete Manual as outlined herein shall be submitted for approval before conducting instruction sessions in operation, before systems or equipment tests are performed, and before final or beneficial occupancy.

B. Manuals shall have rigid covers and index tabs for each major piece of equipment, auxiliaries, and systems. The following shall be inscribed on the cover: the words "OPERATION AND MAINTENANCE MANUAL", the name and location of the building, the name of the Section, such as "Heating" and the name of the Mechanical Contractor. Two (2) copies of each approved manual shall be submitted to the Owner and one (1) copy shall be submitted to the Architect/Engineer.

C. Each piece of equipment shall be listed and identified with the same name, mark, number, or other identification as noted or scheduled in the Contract Documents.

D. Manuals shall include the following:

1. Complete Operating Installations, covering start-up and shutdown for all components installed.

2. Legible copies of all Shop Drawings. Any comments incorporated in "as noted" approvals of Shop Drawings shall be recorded on the Drawings included in the Manuals.

3. All equipment Maintenance and Service Manuals.

4. A complete parts list for each piece of equipment.

5. All descriptive literature for the equipment.

6. Operating characteristics, performance data, ratings, and curves for each piece of equipment such as condensers, fans and air handling units.

7. Internal wiring and control diagrams.

8. Automatic temperature control diagrams, part descriptions and numbers, and sequences of operation. Drawings shall be neatly folded and inserted in a separate clear plastic binder. The plastic binders shall be bound in the back of each Manual.

9. Final Testing and Balancing Reports.

10. All other information pertinent to the maintenance and servicing of equipment and systems provided in the Project.

11. Name, address, and telephone number for service on each manufacturer's equipment.

3.11 OPERATING INSTRUCTIONS

A. After all equipment and services are in operation, and the Operation and Maintenance Manuals are available, an instruction and training session shall be conducted for the Owner's operating personnel.

B. Instruction sessions shall be conducted during the Owner's normal working periods, and at times and locations satisfactory to the Owner.

3.12 EQUIPMENT START-UP

A. No equipment shall be placed in operation until it has been inspected by a qualified representative of the manufacturer and certified to be ready for operation. The manufacturer's representative shall supervise the start-up operation and shall be responsible for all adjustments are required to meet design conditions. Such services shall be at no additional cost to the Owner.

3.13 GUARANTEE

A. The Mechanical Contractor shall present to the Owner a written Guarantee covering his work, including all equipment, material and workmanship. This Guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

B. Any defective work, equipment, material and/or workmanship that develops within the Guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Mechanical Contractor without cost to the Owner.

3.14 FINAL INSPECTION

A. When the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make the inspection. At the time of inspection, the Mechanical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

3.15 FINAL PAYMENTS

A. All Final Payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

END OF SECTION 23 05 00

SECTION 23 05 53 - MECHANICAL IDENTIFICATION

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

B. This Section includes Mechanical Identification Materials and Devices.

1.3 QUALITY ASSURANCE

A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.4 SEQUENCING AND SCHEDULING

A. Coordinate installation of identifying devices after completion of covering and painting where devices are applied to surfaces. Install identifying devices prior to installation of acoustical ceilings and similar concealment.

PART II - PRODUCTS

2.1 MATERIALS

A. Color: Unless specified otherwise, shall conform to ANSI/ASME A13.1.

B. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.

C. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1½ inch diameter.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART III - EXECUTION

3.1 PREPARATION

A. De-grease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with manufacturers recommendations.

3.2 INSTALLATION

A. Plastic Nameplates: Install with corrosive resistant mechanical fasteners.

B. Plastic Tags Install with corrosive resistant chain.

C. Plastic Tape Pipe Markers: Install completely around pipe in accordance with

manufacturer's instructions.

D. Underground Plastic Pipe Markers: Install 6 to 8 inches below finished grade, directly above buried pipe.

E. Equipment: Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with plastic tag.

F. Controls: Identify control panels and major control components outside panels with plastic nameplates.

G. Valves: Identify valves in main and branch piping with tags.

H. Piping: Identify piping, concealed or exposed, with plastic tape pipe markers. Tags may be used on small diameter piping. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and "T", at each side of penetration of structure or enclosure and at each obstruction.

END OF SECTION 23 05 53

RELATED DOCUMENTS:

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

SYSTEM DESCRIPTION

The air conditioning system shall be a duct-free electric split system, consisting of a compact, wall mounted indoor fan coil section with wireless remote controller and a horizontal discharge outdoor unit with constant speed compressor, charged with R410A refrigerant.

WORK INCLUDED

Duct free split system air conditioning and heat pump units.

RELATED WORK

Division 15B

Division 16

REFERENCES

ARI 210 – Unitary Air Conditioning and Air-Source Heat Pump Equipment

QUALITY ASSURANCE

A. The units shall be listed by Electrical Laboratories (ETL) and bear the ETL label.
B. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
C. The units shall be rated in accordance with ARI Standard 210 and bear the ARI label.
D. The units shall be manufactured in a facility registered to ISO 9001 and ISO 1400-1.
E. A full charge of R-410A for 100 feet of refrigerant tubing shall be provided in the condensing unit.
F. A dry air holding charge shall be provided in the evaporator.
G. System efficiency shall meet or exceed 13.0 SEER.

Delivery, Storage and Handling

a) Unit shall be stored and handled according to the manufacturer's recommendation.
b) The wired controller shall be shipped inside the carton with the indoor unit and able to withstand 105 F storage temperatures and 95% relative humidity.

WARRANTY

The units shall have a manufacturer's warranty for a period of one (1) year from date of installation. The compressor shall have a warranty of six (6) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

PERFORMANCE

Each system shall be rated based on 80°F db, 67°F wb for the indoor unit and 95°F db, 75°F wb for the outdoor unit. System efficiency shall meet or exceed 13.0 SEER and shall provide a nominal cooling capacity of 12,000 btuh.

PRODUCTS

Indoor Unit:
The indoor unit shall be factory assembled, wired and run tested. All factory wiring, piping control circuit board and fan motor shall be contained within the unit. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes will be charged with dry air instead of R-410A before shipment from the factory. The casing shall have a white finish. Multi-directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining shall be standard. There shall be a separate back plate to secure the unit firmly to the wall. Return air shall be filtered by means *of* an easily removable washable filter.

The evaporator fan shall be an assembly with a direct drive line-flow fan, and shall be statically and dynamically balanced. A single motor shall be provided with permanently lubricated bearings. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left or right). A motorized air sweep flow louver shall provide an automatic change in airflow by directing the air up and down to provide for Uniform air distribution. The indoor fan shall consist of two (2) speeds, High and Low.

The evaporator coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phoscopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil.

The unit electrical power shall be 115 volts, 1 phase, and 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 103 volts to 127 volts. The indoor unit shall not have any supplemental electrical heat elements.

The unit shall have a wired controller to perform input functions necessary to operate the system. The controller shall consist of an On-Off switch, Cool/Dry-Pan selector, Thermostat setting, Timer Mode, High-Low fan speed, Auto Vane selector, Test Run switching and Check Mode switching. Temperature changes shall be by 2°F increments with a range of 65 - 87°F. The control system shall consist of two (2) microprocessors interconnected by a single non-polar two wire cable. Wiring shall run direct from the indoor unit to the controller with no splices. Manufacturer shall provide (2) 18 Ga. stranded wire conductors for connection to remote controller. The micro-processor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wired controller, providing emergency operation and controlling the outdoor unit. Normal operation of the remote controller provides individual system control in which one remote controller and one indoor unit are installed in the same room. The controller shall have the capability of controlling up to a maximum of fifty (50) systems at a maximum developed control cable distance of 1,650 feet. The control voltage from the controller to the indoor unit shall be 12 volts, DC. The control voltage between the indoor unit and the outdoor unit shall be 12 volts, DC. The system shall be capable of automatic restart when power is restored after power interruption. The system shall include self-diagnostics including total hours of compressor run time. The microprocessor within the wall mounted remote controller shall provide automatic cooling, display set point and room temperature, 24 hour on/off timer so that automatic operation function display, check mode for memory of most recent problem. Control system shall control the continued operation of the air sweep louvers, as well as provide on/off and system/mode function switching. The controller shall have the capability to provide sequential starting with up to fifty seconds delay. Two remote controllers can be used to control one unit.

Outdoor Unit:
The outdoor unit shall be designed specifically for use with PK series indoor units. The unit shall be equipped with a circuit board that interfaces to the PK indoor unit and perform all functions necessary for operation. The unit must have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each

unit must be run tested at the factory. The casing shall be fabricated of galvanized steel, bonderized and finished with a powder coated baked enamel.

The unit shall be furnished with either one or two direct drive propeller type fans. The motor shall have inherent protection, be permanently lubricated bearings. The fan motor shall be mounted for quiet operation. The fan shall be provided with a raised guard to prevent contact with moving parts. The outdoor unit shall have horizontal discharge airflow.

The condenser coil shall be of nonferrous construction with lanced or corrugated plate fins on copper. The coil shall be protected with an integral metal guard. Refrigerant flow from the condenser shall be controlled by means of a metering orifice.

The compressor shall be a high performance rotary. A crankcase heater shall be factory mounted on the outside of the compressor. The outdoor unit shall have an accumulator. The compressor will be equipped with an internal thermal overload and high pressure safety switch. The outdoor unit must have the ability to operate with a maximum height difference of without 164 feet and have refrigerant tubing length of 164 feet between indoor and outdoor units. The need for line size changes, traps or additional oil shall be covered by the M.C. The compressor shall be mounted to avoid the transmission of vibration. The outdoor unit shall be capable of operating at 0°F ambient temperature without additional low ambient controls (Optional wind baffle may be required).

The unit electrical power shall be 115 volts, 1 phase, and 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 103 volts to 127 volts. The outdoor unit shall be controlled by the microprocessor located in the indoor unit. The control voltage between the indoor unit and the outdoor unit shall be 12 volts. DC.

END OF SECTION

RELATED DOCUMENTS:

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

REFRIGERATION PIPING:

Refrigeration piping shall be seamless ACR hard drawn tempered copper refrigeration tubing, cleaned and capped in accordance with ASTM B-280, with wrought copper long radius fittings manufactured specifically for refrigeration service. Soft copper tubing will be permitted only below grade or inside inaccessible chases.

REFRIGERATION PIPING INSTALLATION:

Refrigeration piping shall be sized in accordance with the H.V.A.C. equipment manufacturer's recommendations. Provide calculations of hot gas discharge and suction line sizing approved by manufacturer with shop drawing submittal. All piping shall be run straight and true as possible with the building structure to prevent compressor lubricating oil from trapping in system.

Braze joints with silver alloy type refrigeration filler rod with 15% silver, 80% copper composition. All joints shall be made with filled with nitrogen. Brazing shall be done by workman certified under ASME "WELDING AND BRAZING QUALIFICATIONS" section IX. All open refrigerant piping shall be capped with plastic seals at ALL times. See Specification Section 15600 for field installed accessories.

TESTING:

Test refrigerant piping using dry nitrogen at 1-1/2 times the operating working pressure for 24 hours without leakage. Brush connections with soap solution for visible bubble test. If no leaks are found, Contractor shall charge system with 20% refrigerant and 80% nitrogen mixture to 200 psig, and perform halide lamp test at all fittings and system connections. System pressure shall be maintained for 24 hours. Upon successful completion of above tests, evacuate system using vacuum pump capable of at least 500 microns mercury absolute and hold for four hours without rise in pressure (with allowable compensation for change in temperature). Apply heat to elbows, loops and low spots during evacuation. Re-charge system in strict accordance with manufacturer's instructions.

If a system leak is discovered, Contractor shall first reclaim existing refrigerant using a refrigerant recovery unit. Venting refrigerant to atmosphere will not be permitted on this project.

INSULATION:

Insulate exterior refrigerant suction pipe with 1-1/2" thick closed cell rubber pipe insulation and interior refrigerant piping with 1" closed cell rubber pipe insulation or per current NC Energy Conservation code requirements, whichever is larger, prior to making joints. Provide Armstrong AP Armaflex or equivalent. Fabricate mitered covers over elbow fittings. Insulation sections shall be jointed using Armstrong 520 Adhesive. Follow all manufacturers' installation instructions in strict accordance. Splitting insulation or the use of duct tape to join insulation sections will not be permitted on this project. Wrap insulated pipe with 0.016 inch thick embossed aluminum jacketing with longitudinal slip joints, secured with 3/8" wide bands.

REFRIGERATION PIPE SUPPORT:

Provide clevis-type hangers on 10' centers and within 12" of elbows. Liquid line shall be attached to the insulated suction line with nylon clamps or ties at 6' intervals.

END OF SECTION

DIVISION 26 - Electrical

260500	Basic Electrical Requirements
260510	Electrical Identification
260513	Wires and Cables
260526	Grounding
260533	Raceways, Boxes, and Cabinets
262710	Disconnects
262726	Wiring Devices
265100	Interior Lighting

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART I - GENERAL

1.1 GENERAL CONDITIONS

A. The Stipulations and Conditions stated in this Section, together with all provisions of the "Instructions to Bidders", "General Conditions", "Supplemental General Conditions" and "Special Conditions", hereinbefore set forth, shall apply to this and the other Sections of Division 26.

1.2 GENERAL REQUIREMENTS

A. The General Requirements hereinafter listed apply to the Electrical Work Division. If there is any conflict between the General Requirements and the General Conditions, the General Conditions shall take precedence.

B. Removed

1.3 ALTERNATES

A. Carefully examine all alternates at the back of this Specification and on the Drawings to determine if any work described under the Electrical Section will be affected thereby.

1.4 INTENT

A. The intent of these Drawings and Specifications are to describe the installation of a complete, fully adjusted, and operational system meeting all of the requirements of the State Building Codes and all SCO guidelines and requirements. Therefore, any items shown on Drawings and not specifically called for in the Specifications, or any items specified and not specifically indicated or detailed on the Drawings, or any items neither specified or shown, but which are reasonably incidental to and commonly required to make a complete job, will be furnished and installed by the Electrical Contractor at his own expense.

1.5 DEFINITIONS

A. The Electrical Contractor shall provide all supervision, labor, material equipment, machinery, plant, and any and all other items necessary to complete the Electrical systems. All items of equipment are specified in the singular; however, the Electrical Contractor shall provide the number of items of equipment as indicated on the drawings, and as required for complete systems.

Where the word "provide" is used, it shall mean "furnish and install complete and ready to use".

1.6 VISIT TO THE SITE

A. The Electrical Contractor shall visit the site before submitting his bid so as to be thoroughly familiar with the job conditions and/or peculiarities. No extra payment will be allowed for anything which could have been anticipated from a visit to the site.

1.7 REGULATORY REQUIREMENTS

A. All work under this section shall be accomplished in strict accordance with State codes. Where these plans and specifications conflict with such codes, the codes shall govern.

B. The Electrical Contractor shall notify the Architect or Engineer of such conflicts in writing prior to receipt of bids.

C. References to the National Electrical Code (NEC), Underwriters Laboratories, Inc. (UL), and National Fire Protection Association (NFPA) are a minimum installation requirement.

D. The following regulatory shall be used as minimum standards:

AEIC	American Association of Edison Illuminating Companies
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronic Engineers
NCCM	N.C. Construction Manual w/G.S. as listed
NCSBC	N.C. State Building Code
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
U/L	Underwriters' Laboratories, Inc.
OSHA	Occupational Safety and Health Standards
ASHRAE/IES	90.1 energy code

1.8 TEST STANDARDS

A. All material and equipment shall be listed, labeled or certified by a nationally recognized testing laboratory to meet Underwriters Laboratories, Inc., or third party agencies accredited by the North Carolina Building Code Councils latest edition or amendment.

1.9 PERMITS AND FEES

A. The Electrical Contractor shall make all necessary arrangements, obtain all necessary approval, obtain all permits and pay fees required for the installation of any of the work covered under the Electrical Work Division of the Specifications. Any fees required by any utility companies or municipal authorities for the final connections for these services shall be paid by the Electrical Contractor under whose work such services appear. Before the job is certified as substantially complete, a Certificate of Approval from all authorities involved must be obtained and turned over to the Architect/Engineer.

1.10 DRAWINGS AND SPECIFICATIONS

A. The Electrical Drawings and Specifications are intended to cover all the work enumerated under the respective headings. The Drawings are diagrammatic only. No Contractor shall take advantage of conflict or error between Drawings and Specifications, or between General Drawings and Mechanical, Plumbing and/or Electrical Drawings, but shall request a clarification of such from the Architect/Engineer, should this condition exist. If there is insufficient time to issue an Addendum for this clarification, the Electrical Contractor shall include in his bid the most expensive of the items in conflict.

B. The Electrical Contractor shall refer to the Architectural and Structural Drawings and Specifications for the general construction of the building, for floors and ceiling heights, for locations of walls, partitions, beams, etc., and shall be guided accordingly for setting of all sleeves, inserts and equipment. No Contractor shall under any circumstances scale drawings for the location of equipment. The Electrical Contractor shall verify the locations of all utility services and electrical equipment.

C. The Electrical Contractor shall keep at least one set of corrected Shop and Design Drawings at the site. Drawings are to be current, denoting approved modifications and actual installed departure. Submit Drawings to Architect/Engineer before final payment is made.

1.11 SUPERVISION

A. The Electrical Contractor performing the work specified shall be required to employ a qualified superintendent or foreman to continuously supervise the installation of their work, with authorization to act as agent. He shall be capable of checking layouts, coordinating and supervising the work, establishing grades and levels and locating chases, openings, hangers, inserts, sleeves, etc.

PART II - PRODUCTS

2.1 STANDARD PRODUCTS

A. Unless otherwise indicated in writing by the Architect/Engineer, the materials to be provided under this Specification shall be standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design. All items of the same type or rating shall be identical.

2.2 SUBMITTAL

A. The Electrical Contractor shall submit, for approval, detailed Shop Drawings on all major equipment and where requested. No materials or equipment may be delivered to the job site or installed until the Electrical Contractor has in his possession the approved Shop Drawing for the particular material or equipment. The Electrical Contractor shall furnish the number of copies required by the General or Special Conditions of the contract, but no case less than six (6) copies.

B. Submitted material shall be properly labeled indicating specific service for which material or equipment is to be used, Section and Article Number of Specifications governing, Contractor's name and name of job.

C. Approval of equipment will not relieve the Electrical Contractor of compliance with the Specifications even if such approval is made in writing, unless the attention of the Engineer is called to the non-complying features by letter accompanying the submittal data. Approval of submittal data by the Engineer shall not be construed as a complete check of approval of detailed dimensions, weights, gauges, and similar details with the proposed articles. The conformance with the necessary coordination between the various other Contractors and suppliers shall be solely the responsibility of the Electrical Contractor and with no additional expense to the Owner.

2.3 SUBSTITUTIONS

A. Manufacturer's lists are to establish a standard of quality and not intended to limit the selection to these manufacturers. All materials and equipment which are essential and have not been specified or shown shall be new and of the highest grade and quality free from defect or other imperfections. It should be understood that where the words "furnished and installed" are used, it is intended that the Electrical Contractor shall purchase and install all materials required, unless otherwise noted.

B. All materials and equipment proposed as substitutes for these specified shall require a ten (10) day prior approval from the Engineer prior to the bid date. No substitutions will be allowed after the ten (10) day period before the bid date.

C. All products shall be furnished in compliance with NC General Statute 133-3.

2.4 PRODUCT HANDLING

A. Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored and protected in accordance with the manufacturer's recommendations and as approved by the Architect/Engineer. Equipment installed with a factory finish shall be fully protected during construction and shall be maintained free of dust, dirt and foreign matter. Dents and other surface damage shall be repaired or replaced to the satisfaction of the Architect/Engineer at no additional cost to the Owner.

B. The Electrical Contractor shall clean up and remove from the job site all waste materials, packaging, crating, and refuse resulting from his work on a daily basis.

2.5 MATERIALS AND WORKMANSHIP

A. The Electrical Contractor shall perform a first class job, both in material and workmanship. None other will be accepted. Deviations from either will be corrected by the Electrical Contractor at the Electrical Contractor's expense.

B. The material used throughout the work, except when otherwise noted, shall be new and of Specification grade and the best of its kind. No substitutes shall be used unless approved by the Architect/Engineer. All work shall be executed with a maximum speed consistent with safety and good workmanship.

C. Any equipment furnished by the Mechanical Contractor or any other Contractor that is larger than those indicated on the Drawings and described in these Specifications or have different Electrical characteristics, the increase in cost to the Electrical Contractor for larger wires, conduit, circuit breakers, switches, etc. or for changes in work already installed shall be borne by the instigating Contractor.

PART III - EXECUTION

3.1 EXCAVATION AND BACKFILL

A. The Electrical Contractor shall preform any and all trench and pit excavation and backfilling required for the installation of his work. Trenches shall be made with the sides vertical and shall be shored where necessary for the protection of men and equipment. All excavation work shall be done in a careful manner to avoid damage to footers and foundations. The backfilling shall be placed in layers not exceeding 4 inches in depth, wetting each layer as it is placed and thoroughly compacting each layer with Mechanical tamper or other approved means. Any damage done during excavation and backfilling operations to roads, sidewalks, curbs, shrubs, sod, footers, foundations, etc. shall be replaced to its original condition prior to construction at no expense to the owner. All work will be approved by the Engineer.

3.2 SCAFFOLDING, RIGGING AND HOISTING

A. The Electrical Contractor shall furnish all necessary scaffolding, staging, rigging and hoisting required for the completion of his work. All such scaffolding, etc., shall be removed from the premises when its use is no longer required on the job.

3.3 CUTTING AND PATCHING

A. The Electrical Contractor shall provide all cutting and patching necessary to install the work specified in the 26000 Sections. The patching shall match adjacent surface material and finishes.

B. No Structural member shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.

C. Cutting or Holes:

1. Locate holes in advance where they are proposed in the Structural Sections such as ribs or beams. Obtain the approval of the Engineer prior to drilling through Structural Sections.

2. Cut holes through concrete and masonry in new and existing structures with a diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not allowed.

3.4 WATERPROOFING

A. At floor, exterior wall, and roof conduit penetrations, completely seal clearances around the conduit and make watertight. All work subject to approval of the Engineer.

3.5 EQUIPMENT SPACE AND ARRANGEMENT

A. The equipment shall fit into the space allotted and shall allow adequate clearance for entry, installation, replacement, servicing, and maintenance. The Electrical Contractor shall coordinate the work to ensure that equipment may be moved into place without altering building components or other installations. Access space shall not be less than the equipment manufacturer's requirements. Working clearances shall be not less than N.E.C or other regulatory requirements.

B. These drawings indicate the extent and general arrangement of equipment. If any departures are deemed necessary by the Electrical Contractor, details of such

departures and the reasons therefore shall be submitted to the Architect/Engineer for approval as soon as practicable and within 30 days after Award of the Contract. No departure shall be made without written approval of the Architect/Engineer. Any delay on the Contractor's part to provide such submittal will not constitute an extension of the Contract time.

3.6 DAMAGE TO WORK ALREADY IN PLACE

A. The Electrical Contractor shall assume full responsibility for any damage done by him, his agents or employees, to any work already in place. Any such damage done shall be repaired at the Contractor's expense by Mechanics skilled at their respective trades, to the approval of the Architect/Engineer.

3.7 JURISDICTION OF WORK

A. It may become necessary for the Electrical Contractor to furnish labor or materials which are not generally accepted as part of this trade. In cases of this type, he shall contract the work or shall furnish materials and employ workmen of the trade involved in order not to cause any delay or stoppage of work caused by infringement of Trade Agreements as to jurisdiction, alleged or actual.

3.8 COORDINATION WITH OTHER TRADES

A. All work shall be coordinated with other trades involved in the construction project. All work shall be carefully laid out in advance to coordinate Architectural, Structural, Mechanical, Plumbing and Electrical features of construction. The Contractor shall verify at the site all locations, grades, elevations and utility service connections indicated. Any conflicts due to lack of proper coordination shall be brought to the attention of the Architect/Engineer for resolution. The Electrical Contractor shall make required changes or relocations at no additional cost to the Owner.

B. Installation, inspection, and testing of work above ceilings shall be completed and approved by the Architect/Engineer prior to installation of the specified finished ceilings. However, a Ceiling Suspension System may be installed as required for coordination.

C. The Electrical Contractor shall consult with the other trades at the start of the work and periodically thereafter, as required to properly coordinate the various items of work, and to avoid interferences. Should any interferences of any nature develop as the work progresses, such interferences shall be resolved and eliminated as directed. The cost of any work directed shall be borne by the Subcontractor or Contractors directed to do this work.

3.9 DIVISION OF WORK

A. These paragraphs are intended to show exactly the point of division of work between the Electrical Division and the Mechanical Division or any other division.

C. All equipment covered in the Mechanical Division or any other Division of the Specifications shall be furnished, mounted, and aligned under the respective Division.

All starters, controls and wiring for this equipment, including final connection to the same, shall be furnished and installed under that Division.

D. Divisions of the Specifications shall be completed under the respective Division.

E. Under Division 26, the Contractor shall be responsible for providing all line side power wiring, conduit, disconnect switches, and junction boxes as shown on the electrical drawings.

3.10 EQUIPMENT INSTALLATION

A. Manufacturer's Instructions: Equipment shall be installed as recommended by the manufacturer to conform to the requirements of the particular application, in accordance with these Drawings and Specifications.

B. Intermediate Inspections: The electrical work done under this contract shall be subject to periodic inspections by the Engineer of Record and by the State Electrical Inspector. No work shall be covered up or concealed until it has been inspected by the AHJ, The Engineer of Record (EOR) and/or the State Electrical Inspector and it is the responsibility of the electrical contractor to schedule all inspections during normal weekday office hours (8am-5pm). Contractor shall give EOR a minimum of 96 hour notice of required inspections.

3.11 OPERATION AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 of this project manual. In addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer's printed Operating Procedures to include start-up, break-in, and routine and normal Operating Instructions; regulation, control, stopping, shutdown, and emergency instructions and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and re-assembly; aligning and adjusting instructions.

4. Servicing Instructions and Lubrication Charts and Schedules.

3.12 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1 requirements. In addition to the requirements specified in Division 1, indicate installed

conditions for:

1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.

2. Equipment locations (exposed and concealed) dimensioned from prominent building lines.

3. Approved substitutions, Contract modifications and actual equipment and materials installed.

3.13 GUARANTEE

A. The Electrical Contractor shall present to the Owner a written guarantee covering his work, including all equipment, material and workmanship. This guarantee shall be against all defects in any of the above work, and shall run for a period of one (1) year from the date of written acceptance of the Contractor's work.

B. Any defective work, equipment, material and/or workmanship that develops within the Guarantee period, which is not caused by ordinary wear or abuse by other persons, shall be replaced by the Electrical Contractor without cost to the Owner.

3.14 FINAL INSPECTION

A. After acceptance by the authority having jurisdiction and when the entire Contract has been completed and the work is ready for final inspection, the Architect/Engineer or his duly authorized representative will make an inspection. Electrical Contractor shall notify State Construction Office electrical inspector of the scheduled date and time of final inspection. At the time of inspection, the Electrical Contractor shall demonstrate to the Architect/Engineer that the various systems and pieces of equipment have been adjusted to operate in accordance with the requirements of the Contract.

3.15 FINAL PAYMENTS

A. All Final Payments are contingent upon all necessary Certificates and/or Approvals cited above, together with the written Guarantee being presented to the Owner.

3.16 DOCUMENTATION

A. All tests shall be completely documented indicated time of day, temperature, and all pertinent test information.

B. 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 00

SECTION 26 05 10 - ELECTRICAL IDENTIFICATION

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes Identification of Electrical Materials, Equipment and Installations.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product Data for each type of product specified.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Ideal Industries, Inc.
2. National Band and Tag Co.
3. Panduit Corp.
4. Seton Name Plate Co.
5. Standard Signs, Inc.
6. W.H. Brady, Co.

2.2 ELECTRICAL IDENTIFICATION PRODUCTS

A. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width. Colors to match color schemes noted herein.

B. Underground Line Marking Tape: Permanent, bright colored, continuous printed, metallic strip, plastic tape compounded for direct burial service not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.

C. Wire/Cable Designation Tape Markers: Vinyl or vinyl cloth, self adhesive, wrap-around, cable/conductor markers with pre-printed numbers and letter.

D. Engraved, Plastic Laminated Labels, Signs, and Instruction Plates: Engraving stock melamine plastic laminate, 1/16th inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8th inch thick for larger sizes. Engraved legend in white letters on black face and punched for mechanical fasteners. (Match face colors with the system equipment.) See color schemes.

E. Fasteners for Plastic Laminated and Metal Signs: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

F. Cable Ties: Fungus inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from minus 50 degrees F to 350 degrees F. Provide ties in specified colors when used for color coding.

PART III - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors and other designations used in Electrical Identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

B. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

C. Identify Raceways of Certain Systems with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be colored adhesive marking tape, (painting of conduit will not be allowed). Make each color band 3 inches wide, completely encircling conduit. Install bands at changes in direction, at penetrations of walls and floors, and at 25-foot maximum intervals in straight runs. Apply the following colors:

1. Fire Alarm System: Bright Red
2. Security System: Dark red (Burgundy)
3. Data/VOIP System: Brown
4. Telephone System: Orange

D. Identify Junction, Pull, and Connection Boxes: Install on outside of box cover. Label box covers with identity of contained circuits. Use pressure-sensitive plastic labels at exposed locations and similar labels concealed boxes. Color code boxes as indicated below. Method shall be by colored adhesive not less than 4 square inches for 4" boxes and larger boxes. Permanent type "magic" markers are not accepted as a means of identification.

120/208 or 120/240 volt Blue

E. Underground Electrical Line Identification: During trench backfilling, for exterior underground power, signal and communications lines, install continuous underground plastic line marker, located directly above line at 6 inches below finished grade where multiple lines are installed in a common trench or concrete envelope. Provide marker tape to cover 2/3 of the overall width.

F. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

240/120 Volts	**Phase**
Black	A
Red	B

White	Neutral
Green	Ground

G. Use conductors with color factory-applied the entire length of the conductors except as follows:
1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.

a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration minimum width 2".

H. Tag or label conductors as follows:
1. Multiple Circuits: Where multiple branch circuits or control wiring or communications/signal conductors are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control and communications/signal wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

2. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

I. Install equipment/system circuit/device identification as follows:
1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with 1/2 inch high lettering on 1½ inch high label (2 inch high where two lines are required), white lettering in blue field for normal power equipment other face colors shall match the equipment served. Text shall match terminology and numbering of the Contract Documents and shop drawings.

2. All Phenolic labels shall be securely attached to the equipment by self-tapping stainless steel screws.

3. Name plate colors shall be as follows: (General Information List)

....Blue surface with white core for 120/208-240 Volt Equipment.

....Dark Red surface with white core for all equipment related to Fire Alarm System.

....Green surface with white core for all equipment related to "Emergency" Systems.

....Brown surface with white core for all equipment related to the Data Systems.

J. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panelboards and alarm/signal components, where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker. Pencil in all spare and leave spaces blank.

K. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

L. 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 pressure sensitive label applied to the conduit or outlet; designate "use" and "location served".

END OF SECTION 26 05 10

SECTION 26 05 13 - WIRES AND CABLES

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Building Wires and Cables and Associated Splices, Connectors and Terminations for Wiring Systems rated 600 Volts and Less.

PART II - PRODUCTS

2.1 BUILDING WIRES AND CABLES

A. (North Carolina Building Code Council approved third party nationally recognized testing laboratory) UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Applications" Article.

B. Rubber Insulation: Conform to NEMA WC 3.

C. Thermoplastic Insulation: Conform to NEMA WC 5.

D. Cross-Linked Polyethylene Insulation: Conform to NEMA WC 7.

E. Ethylene Propylene Rubber Insulation: Conform to NEMA WC 8.

F. Solid conductor for 10 AWG and smaller: Stranded conductor for larger than 10 AWG.

2.2 CONNECTORS AND SPLICES

A. (North Carolina Building Code Council approved third party nationally recognized testing laboratory) UL-listed factory fabricated wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated.

PART III - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Feeders and Branch Circuits: Type THHN\THWN or XHHW, copper conductor, in raceway.

3.3 INSTALLATION

A. All conductors shall be copper.

B. Minimum conductor size for power and lighting circuits shall be #12 AWG. Maximum conductor size shall be 500 KCMIL AWG.

C. All power and lighting circuits #10 awg and smaller shall be solid copper conductors. Conductor sizes #8 awg and larger shall be Class "B" stranded copper conductors.

D. Pull conductors into raceway simultaneously where more than one is being installed in same raceway.

1. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.

2. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.

E. Conductor Splices: Keep to minimum.

F. Wiring at Outlets: Install with at least 8 inches of slack conductor at each outlet.

G. Connect outlets and components to wiring and to ground as indicated. Tighten to UL Standard 486A.

H. All power circuits noted for computer equipment with isolated grounding shall be individually installed in a separate conduit with separate phase, neutral conductor, grounding conductor, and isolated grounding conductor, unless noted otherwise.

I. In no case shall any wire installed to a device exceed the U.L. rating of the device.

3.4 SPLICING

A. Joints in solid conductors shall be using Idea "wire nuts", 3M Company "scotch lock", or "T&B" "PIGGY" connectors in junction boxes, outlet boxes and lighting fixtures.

B. "Sta-kon" or other permanent type crimp connectors shall not be used for branch circuit connections.

C. Joints in stranded conductors shall be spliced by approved mechanical connectors. Solderless mechanical connectors similar to "NSI" multi-cable connector blocks for splices and taps, provided with UL approved insulating covers, may be used instead of mechanical connectors plus tape.

D. Conductors in all cases, shall be continuous from outlet to outlet unless "taps" are required and shall be made only within outlet, junction boxes, troughs and gutters.

3.5 VOLTAGE DROP

A. Where 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 be not

smaller than #10 awg.

B. Where the conductor length from the panel to the first outlet on a 277 volt circuit exceeds 125 feet, the branch circuit conductor from the panel to the first outlet shall be not smaller than #10 awg.

3.6 FIELD QUALITY CONTROL

A. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1.Procedures: Perform each Visual and Mechanical Inspection and Electrical Test stated in NETA Standard ATS, Section 7.3.1. Certify compliance with test parameters.

B. Correct malfunctioning products at site, where possible, and re-test to demonstrate compliance; otherwise, remove and replace with new units and re-test.

3.7 ELECTRICAL TESTING

A. Feeder Insulation Resistance Testing:

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

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

3. After all 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 conductor insulation tester 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 the neutral bar. Test each neutral conductor separately until the low readings are found. The Contractor shall correct troubles, reconnect and re-test until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.

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

END OF SECTION 26 05 13

SECTION 26 05 26 - GROUNDING

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes Solid Grounding of Electrical Systems and Equipment. It includes basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.

1.3 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled by a North Carolina Building Code Council approved third party nationally recognized testing laboratory. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.

PART II - PRODUCTS

2.1 GROUNDING AND BONDING PRODUCTS

A. Products: Of types indicated and of sizes and ratings to comply with NEC. Where types, sizes, ratings, and quantities indicated are in excess of NEC requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

B. Conductor Materials: Copper

2.2 WIRE AND CABLE CONDUCTORS

A. General: Comply with Division 26 Section "Wires and Cables". Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

B. Equipment Grounding Conductor: Green insulated

C. Grounding Electrode Conductor: Stranded cable

D. Bare Copper Conductors: Conform to the following:

1. Solid Conductors: ASTM B-3
2. Assembly of Stranded Conductors: ASTM B-8
3. Tinned Conductors: ASTM B-33

2.3 MISCELLANEOUS CONDUCTORS

A. Ground Bus: Bare annealed copper bars of rectangular cross section, full-size rated.

B. Braided Bonding Jumpers: Copper tape, braided No. 30 gauge bare copper wire, terminated with copper ferrules.

C. Bonding Strap Conductor/Connectors: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

2.4 CONNECTOR PRODUCTS

A. General: Listed and labeled as Grounding Connectors for the materials used.

B. Pressure Connectors: High conductivity-plated units

C. Bolted Clamps: Heavy-duty units listed for the application

D. Exothermic Welded Connections: Provided in Kit Form and selected for the specific types, sizes and combinations of conductors and other items to be connected.

2.5 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel with high strength steel core and electrolytic grade copper outer sheath, molten welded to core.

1. Size: 3/4 inch by 10 feet

PART III - EXECUTION

3.1 APPLICATION

A. Equipment Grounding Conductor Application: Comply with NEC Article 250 for sizes and quantities of equipment grounding conductors, except where larger sizes or more conductors are indicated.

1. The raceway system shall not be relied on for ground continuity .Install an equipment ground conductor in all power related conduits. Size conductor as required by NEC Table 250-122. Data and Signal conduits do not require a separate grounding conductor unless required by the manufacturer of the equipment to be installed.

2. Install separate isolated equipment grounding conductors with circuit conductors for the following in addition to those locations where required by Code.

a. Isolated grounding type receptacles

B. Underground Conductors: Bare, stranded copper except as otherwise indicated.

C. Signal and Communications: For telephone, alarm, and communication systems, provide a #4 AWG minimum green insulated copper conductor in raceway from the grounding electrode system to each terminal equipment location. Leave 3' pigtail wiring at termination point where equipment boards are shown. Make direct connection where equipment is provided.

D. Separately derived systems required by NEC to be grounded shall be grounded in accordance with NEC section 250-30.

3.2 INSTALLATION

A. General: Ground electrical systems and equipment in accordance with NEC requirements except where the Drawings or Specifications exceed NEC requirements.

B. The electrical service shall be grounded by three (3) means:

1. To the cold water main, if metallic and in direct contact with the earth for at least 10 feet as per the 2017 NEC Article 250-50 as amended by the North Carolina Building Code.

2. To the steel frame of the building, provided the building frame is effectively grounded.

3. To ground rod(s)

C. Ground Rods: Locate a minimum of one-rod length from each other and at least the same distance from any other grounding electrode. Interconnect ground rods with bare conductors buried at least 24 inches below grade. Connect bare-cable ground conductors to ground rods by means of exothermic welds except as otherwise indicated. Make these connections without damaging the copper coating or exposing the steel. Use ¾ inch by 10 ft. ground rods except as otherwise indicated. Drive rods until tops are 6 inches below finished floor or final grade except as otherwise indicated. All ground connections shall be accessible.

D. Metallic Water Service Pipe: Provide insulated copper ground conductors, sized as indicated, in conduit from the building main service equipment, or the ground bus, to main metallic water service entrances to the building. Connect ground conductors to the main metallic water service pipes by means of ground clamps. Where a dielectric main water fitting is installed, connect the ground conductor to the street side of the fitting. Do not install a grounding jumper around dielectric fittings. Bond the ground conductor conduit to the conductor at each end.

E. Route grounding conductors along the shortest and straightest paths possible without obstructing access or placing conductors where they may be subjected to strain, impact, or damage, except as indicated.

3.3 CONNECTIONS

A. General: Make connections in such a manner as to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot tin-coated materials to assure high conductivity and make contact points closer in order of galvanic series.

2. Make connections with clean bare metal at points of contact.

3. Aluminum to steel connections shall be with stainless steel separators and mechanical clamps.

4. Aluminum to galvanized steel connections shall be with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections involving dissimilar metals with inert material such as red lead paint to prevent future penetration of moisture to contact surfaces.

B. Exothermic Welded Connections: Use for connections to structural steel and for underground connections except those at test wells. Install at connections to ground rods and plate electrodes. Comply with manufacturer's written recommendations. Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

C. Terminate insulated equipment grounding conductors for feeders and branch circuits with pressure-type grounding lugs. Where metallic raceways terminate at metallic housings without mechanical and electrical connection to the housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.

D. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values for connectors and bolts. Where manufacturer's torquing requirements are not indicated, tighten connections to comply with torque tightening values specified in UL 486A and UL 486B.

E. Compression-Type Connections: Use hydraulic compression tools to provide the correct circumferential pressure for compression connectors. Use tools and dies recommended by the manufacturer of the connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on the ground conductor.

3.4 FIELD QUALITY CONTROL

A. Tests: Subject the completed grounding system to a earth resistance test at each location where a maximum ground resistance level is specified, at service disconnect enclosure ground terminal, and at ground test wells. Measure ground resistance without the soil being moistened by any means other than natural precipitation or natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2 point method in accordance with Section 9.03 of IEEE 81, "Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Grounding System".

B. Service Grounding Test

1. After completion of the electrical grounding and bonding systems, test the ground resistance with a ground resistance tester. Where test shown resistance-to-ground is over 25 ohms, provide additional ground rods until the minimum of 25 ohms is achieved.

C. Deficiencies: Where ground resistances exceed specified values, and if directed, modify the grounding system to reduce resistance values. Where measures are detected that exceed those indicated the provisions of the Contract, covering changes will apply.

D. Report: Prepare test reports of the ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

3.5 CLEANING AND ADJUSTING

A. Restore surface features at areas disturbed by excavation and re-establish original grades. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other Work to their original condition. Include necessary topsoil, fertilizing, liming, seeding, sodding, sprigging, or mulching.

END OF SECTION 26 05 26

SECTION 26 05 33 - RACEWAYS, BOXES & CABINETS

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

B. Current State Construction Office Electrical Construction Guidelines.

1.2 SUMMARY

A. This Section includes Raceways, Fittings, Boxes, Enclosures and Cabinets for Electrical Wiring.

PART II - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1

B. Intermediate Metal Conduit: ANSI C80.6

C. Electrical Metallic Tubing and Fittings: ANSI C80.3 with compression-type fittings.

D. Flexible Metal Conduit: Zinc coated steel

E. Liquid tight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.

F. Fittings: NEMA FB 1, compatible with conduit/tubing materials.

G. Non-Metallic Rigid Conduit: Schedule 40 pvc as where shown on the drawings.

2.2 WIRE WAYS

A. Material: Sheet metal sized and shaped as indicated.

B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.

C. Select features where not otherwise indicated, as required to complete wiring system and to comply with NEC.

D. Wireway Covers: Match equipment specified.

E. Finish: Paint to match adjacent finish. Work shall be neat and subject to approval by the Architect/Engineer.

2.3 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1

B. Cast Metal Boxes: NEMA FB 1, type FD, cast alloy box with gasketed cover

2.5 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

B. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

C. Pull Boxes: Code gauge steel with screw type removable cover. NEMA rated for the condition.

PART III - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 MINIMUM CONDUIT SIZE: (unless indicated otherwise) on the drawings conduit shall be sized as follows:

A. Indoors: The minimum conduit size shall be 3/4".

1. Flexible metal conduit may be used for tap connection to recessed lighting fixtures.

B. Outdoors: Branch circuit conduit installed below grade to exterior equipment shall be one (1) inch minimum unless noted otherwise.

3.3 WIRING METHODS: Unless noted otherwise on the drawings the following materials shall be used:

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid or intermediate metal conduit.

2. Concealed: Rigid or intermediate metal conduit.

3. Underground, Single Run: Rigid, encased in concrete conduit.

4. Underground, Grouped: Rigid metallic conduit or (non-metallic rigid conduit) where noted.

5. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquid tight flexible

metal conduit.

6. Boxes and Enclosures: NEMA Type 3R or Type 4.

B. Indoors: Use the following wiring methods:

1. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible metal conduit, except in wet or damp locations use liquid tight flexible metal conduit.

2. Damp or Wet Locations: Rigid steel conduit.

3. Exposed: Electrical metallic tubing above 8 feet and rigid metallic conduit below eight (8) feet.

4. Concealed: Electrical metallic tubing, or Rigid steel conduit. MC Cable is NOT allowed on this project.

5. Boxes and Enclosures: NEMA Type 1, except in damp or wet locations use NEMA Type 3R, unless otherwise noted.

3.4 INSTALLATION

A. Telephone/Data/Cable TV outlet boxes shall be 2 gang with appropriate trim and cover. Coordinate cover plates with Owner.

B. Provide insulated bushings for all conduit ends.

C. Conceal rigid conduit and EMT, unless otherwise indicated, within finished walls, ceilings, above attic space and below floors.

D. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

E. Install raceways level and square and at proper elevations. Provide adequate headroom.

F. Complete raceway installation before starting conductor installation.

G. Use temporary closures to prevent foreign matter from entering raceway.

H. Protect stubs from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

I. **Where non-metallic conduit is shown to be used below the slab provide rigid conduit to turn up into the building space or at all exterior walls, poles or equipment.**

J. Use raceway fittings compatible with raceway and suitable for use and location. For

intermediate steel conduit, use threaded rigid steel conduit fittings, except as otherwise indicated.

K. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, except as otherwise indicated. Where the number of bends exceed the total number required by the N.E.C., provide pull boxes as required by code.

L. Install raceways parallel to or at right angles to surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

M. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

3. Provide expansion joint fittings where required for the raceway used.

N. IMC and GRC shall terminate with either a double locknut/bushing set or in a threaded hub.

O. Where conduit type "LB" fittings are used all conduits on conduits over 2" in size shall be "MOGAL" type.

P. "EMT" connectors shall be steel plated hexagonal compression type only. Do not use pot metal, set-screw, or indenter type connectors.

Q. Where concentric, eccentric, or oversized knockouts are encountered, a grounding-type insulated bushing shall be provided.

R. Where conduits of any type pass over a building expansion joint, a standard “expansion joint” fitting, compatible with the type raceway, shall be provided.

S. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

T. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

U. Install pull cords in all empty raceways. Use monofilament plastic line having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull cord.

V. Telephone and Signal System Raceways 2 Inch Trade Size and Smaller: In addition to the above requirements, install in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements. Pull boxes shall be a minimum of 10" square x 6" deep with removable cover.

W. Install raceway sealing fittings at suitable, approved, accessible locations and fill them with sealing compound as required by the referenced NEC sections. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:

1. Where conduits enter or leave hazardous classified locations. (NEC 501.15 A-F)

2. Where conduits pass from warm locations to cold locations, such as exterior spaces and air-conditioned spaces. (NEC 225.27 & 300.7)

3. Where otherwise required by the NEC.

X. Stub-Up Connections: Extend conduits through concrete floor a minimum of 6" for connection to freestanding equipment. Extend conductors to equipment with flexible metal conduit. Where equipment connections are not made under this Contract verify the length of the flexible connectors.

Y. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor.

Z. Set floor boxes level and adjust to floor surface. Provide the proper trimming for the finished floor condition. Flip top brass type cover rings shall be provided for the device shown unless noted otherwise.

AA. Provide grounding connections for raceway, boxes and components. Tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

BB. All underground raceways shall be identified by "UNDERGROUND LINE MARKING TAPE" located directly above the raceway at 6" below finished grade. Tape shall be permanent, bright-colored, continuous, magnetic strip, printed, plastic tape compounded for direct burial not less than 6" wide and 4 mils thick. Printed legend shall be indicative of the service it is marking. Provide sufficient tape not less than 2/3 of the width of the item marked for the full length of the Raceway.

CC. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the sub-up out of the slab or earth shall be rigid steel.

DD. Where shown to be used on the drawings PVC non-metallic conduit used exterior to the building for grouped circuits it shall be encased in a minimum of 3" of 3000 psi rated concrete. Concrete encased non-metallic ducts shall be supported on plastic separators coordinated with duct size and spacing. Separators shall be spaced close enough to prevent sagging and deforming of ducts. Secure separators to the earth and to ducts to prevent floating during placement of concrete. Do not use steel or tie wires in such a way to form conductive or magnetic loops around ducts or duct groups.

EE. The Raceway System shall not be relied on for grounding continuity.

FF. Where non-metallic conduit is allowed on the drawings all bends and off-sets shall be made by approved mechanical benders per the manufacturers instruction. Any conduit not in compliance will be removed.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to paint finishes with matching touch-up coating recommended by the manufacturer.

3.6 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt and construction debris and repair damaged finish, including chips.

END OF SECTION 26 05 33

SECTION 26 27 10 – DISCONNECTS

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes Equipment and Service disconnects.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for Switches and Accessories specified in this Section.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled by a North Carolina Building Code Council approved third party nationally recognized testing laboratory.

1. The Terms "Listed" and "Labeled": As defined in the "National Electrical Code", Article 100.

PART II - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Cutler-Hammer Products; Eaton Corp.
2. Siemens
3. Square D Company
4. G.E.

2.2 ENCLOSED SWITCHES

A. Enclosed Non-Fusible Switch: NEMA KS 1, Type HD, handle lockable with 2 padlocks.

B. Enclosed Fusible Switch, 800 Amperes and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position.

C. Enclosure: NEMA KS 1, Type 1, unless specified or required otherwise to meet environmental conditions of installed location.

D. Outdoor Locations: Type 3R

E. Other Wet or Damp Indoor Locations: Type 4

F. All switches shall be "Heavy Duty" rated for the voltage required.

G. Coordinate all fuse rated switch sizes with the equipment to be furnished. Furnish fuses as specified on equipment name plate data.

H. Safety switches shall be third-party listed.

I. Switches shall have defeatable door interlocks that prevent the door from opening when the operating handle is in the open position.

J. Switches shall have handles whose positions are easily recognizable in the “on” or “off” position. For safety reasons, padlocks shall be provided for switches located in the public areas.

K. Switches shall have non-teasible, positive, quick make-quick-quick-break mechanisms.

L. Switches shall be properly labeled. See section 26 05 10, Electrical Identification.

PART III - EXECUTION

3.1 INSTALLATION

A. Install enclosed switches level and plumb.

B. Where fuses are required, the fuses shall be matched with the equipment supplier's nameplate data requirements.

3.2 FIELD QUALITY CONTROL

A. Testing: After installing enclosed switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

B. Correct malfunctioning units at site, where possible, and retest to demonstrate compliance. Otherwise, remove and replace with new units and re-test.

3.3 CLEANING

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, construction debris and repair damaged finish including chips, scratches and abrasions.

END OF SECTION 26 27 10

SECTION 26 27 26 - WIRING DEVICES

PART I - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes various types of receptacles, connectors, switches and finish plates.

1.3 SUBMITTALS

A. Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each product specified.

PART II - PRODUCTS

2.1 WIRING DEVICES

A. Comply with NEMA Standard WD 1-101968, "General Purpose Wiring Devices".

B. Enclosures: NEMA 1 equivalent, except as otherwise indicated.

C. Color: Selected by Architect.

D. 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 20 amp, 125 volt and the face configuration shall conform to the NEMA Standard No. WDI.101968, 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. Receptacles shall be federal specification heavy duty grade mounted vertically.

E. Receptacles, Straight-Blade, Special Features: Comply with the basic requirements specified above for straight-blade receptacles of the class and type indicted, and with the following additional requirements:

1. Ground Fault Circuit Interrupter (GFCI) Receptacles: UL Standard 943, "Ground Fault Circuit Interrupters" with integral NEMA 5-20R duplex receptacle. Design units for installation in a 2¾ inch (70-mm) deep outlet box without an adapter.
2. 30-A Recreational Vehicle Receptacles: 30-A rated, 125-V, 2 pole, 3 wire, grounding type receptacle as required by 2014 NEC Article 551.81. Recreational

Vehicle receptacle shall installed in weatherproof “extra duty” enclosure.

F. (Removed)

G. Plug Sets: Match voltage and current ratings and number of conductors to requirements of the equipment being connected.

H. Single pole and three/four-way toggle type Snap Switches: Shall be 20 amp 120/277v. a.c. rated, quiet-type a.c. switches, NRTL listed and labeled as complying with UL Standard 20 "General Use Snap Switches" and with Federal Specification W-S-896. Color selected by Architect.

J. (Removed)

K. Wall Plates: Single and combination types that mate and match with corresponding wiring devices. Features include the following:

1. Color: Matches wiring device except as otherwise indicate.

2. Plate-Securing Screws: Metal with heads colored to match plate finish.

3. Material for Finished Spaces: 0.04 inch thick, type 302, satin finished stainless steel, intermediate jumbo size except as otherwise indicated.

2.2 FLOOR SERVICE OUTLET ASSEMBLIES

A. Types: Modular, above-floor, or recessed in floor, dual service units suitable for the wiring method indicated.

B. Compartmentation: Barrier separates power and signal compartments.

C. Housing Material: Die-cast aluminum, satin finished.

D. Power Receptacle: NEMA configuration 5-20R, ivory finish, except as otherwise indicated.

E. Signal Outlet: Blank cover with bushed cable opening, except as otherwise indicated.

PART III - EXECUTION

3.1 INSTALLATION

A. Install devices and assemblies plumb and secure.

B. Install wall plates when painting is complete.

1. Arrangement of Devices: Except as otherwise indicated, mount flush, with long

dimension vertical and grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

C. Protect devices and assemblies during painting.

D. (Removed)

E. Field verify the actual location of all outlet devices above equipment or counter tops before rough-in and installation. Any outlet installed in conflict with equipment or conditions that could have been avoided, will be corrected at the Contractor's expense.

F. Provide weatherproof cast aluminum cover plates for all devices exterior to the building or in "wet" locations. Covers shall be listed as “extra duty” in accordance with 2020 NEC Article 406.9(B)(1).

G. GFCI protection shall be provided for all receptacles exterior to the building, in restrooms or where required by Code.

H. Locate all receptacles in rated walls with 24" minimum horizontal separation. This includes devices located opposite each other in the walls.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Electrical Identification".

1. Switches: Where 3 or more switches are ganged and elsewhere where indicated, identify each switch with approved legend engraved on wall plate.

2. Receptacles: Identify the panelboard and circuit number from which served. Use machine-printed, pressure-sensitive, abrasion-resistant label tape on face of plate and durable wire markers or tags within outlet boxes.

3.3 GROUNDING

A. Isolated Ground Receptacles: Connect to isolated grounding conductor routed to designated isolated equipment ground terminal of Electrical System.

3.4 FIELD QUALITY CONTROL

A. Testing: Test wiring devices for proper polarity and ground continuity. Operate each operable device at least six (6) times.

B. Test ground-fault circuit interrupter operation with both local and remote fault simulations according to manufacturer recommendations.

C. Replace damaged or defective components.

3.5 CLEANING

A. General: Internally clean devices, device outlet boxes and enclosures. Replace stained or improperly painted wall plates or devices.

END OF SECTION 26 27 26

SECTION 26 51 00 - INTERIOR LIGHTING

PART I - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes interior lighting fixtures, lamps, ballasts, emergency lighting units, and accessories.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange product data for fixtures in order of fixture designation. Include data on features and accessories and the following information:

1. Outline drawings of fixtures indicating dimensions and principal features.

2. Electrical ratings and photometric data with specified lamps and certified results of independent laboratory tests.

3. Data on batteries and chargers of emergency lighting units.

4. Shop Drawings from manufacturers detailing non-standard fixtures and indicating dimensions, weights, methods of field assembly, components, features and accessories.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide fixtures that are listed by a North Carolina Building Code Council approved third party nationally recognized testing laboratory and labeled for their indicated use on the Project.

C. Coordination of Fixtures with Ceiling: Coordinate fixtures mounting hardware and trim with the ceiling system. Provide plaster or sheet-rock trims when required on the project whether indicated or not at no additional cost to the Owner. Coordinate with Architectural Plans before ordering fixtures.

1.5 WARRANTY

A. Minimum warranty period on emergency lights shall be three (3) years from date acceptance. Warranty shall include all parts (less lamps).

B. All other lighting products shall be warranted for a period of not less than 1 year from date of acceptance. This warranty does not include miscellaneous parts which are

external to the product (i.e. lamps) which are considered maintenance item.

PART II - PRODUCTS

2.1 FIXTURES - GENERAL

A. Comply with the requirements specified in the Articles below and the Lighting Fixture Schedule on the Drawings.

2.2 FIXTURE COMPONENTS - GENERAL

A. Metal Parts: Free from burrs and sharp corners and edges.

B. Sheet Metal Components: Steel, except as indicated. Components are formed and supported to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating and free from light leakage under operating conditions. Arrange to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in the operating position. Light seal strips inside the fixture will not be allowed.

D. Reflecting Surfaces: Minimum reflectances as follows, except as otherwise indicated:

1. White Surfaces: 85 percent

2. Specular Surfaces: 83 percent

3. Diffusing Specular Surfaces: 75 percent

4. Laminated Silver Metalized Film: 90 percent

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic

1. Plastic: Highly resistance to yellowing and other changes due to aging, exposure to heat and UV radiation.

2. Lens Thickness: 0.125 inches minimum

2.3 LED FIXTURES

A. See Fixture Schedule on drawings for specific fixture descriptions

B. LED luminaires shall have a power factor greater than 90% (0.90) and less than a 20% harmonic distortion.

C. LED drivers shall have integral surge suppression.

2.4 EXIT SIGNS

A. Conform to UL 924, "Emergency Lighting and Power Equipment”.

1. Arrows: Include as indicated.

B. Emergency Exit Signs shall be of the "LED" style.

C. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.

D. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and – negative terminal.

E. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

F. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

G. WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

H. LED-The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Maximum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit at no charge to the owner.

2.5 EMERGENCY LIGHTING UNITS

A. Conform to UL 924, "Emergency Lighting and Power Equipment" requirements for "Unit Equipment". Provide self-contained units with the following features and additional characteristics as indicated.

B. Units shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, NC Building Code, Volume X Energy code, NFPA-101, and NEMA Standards.

C. BATTERY-It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and – negative terminal.

D. CHARGER- It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD

battery is used to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

E. ADDITIONAL FEATURES- Pilot light to indicate the unit is connected to AC power. The battery shall have rate discharge pilot light, unless self-diagnostic type. Test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

F WARRANTY-The entire unit shall be warranted for 3 years. The battery must have an additional 2 more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

2.6 FINISH

A. Steel Parts: Manufacturer's standard finish applied over corrosion-resistant primer, free of streaks, runs, holidays, stains, blisters, and defects. Remove fixtures showing evidence of corrosion during project warranty period and replace with new fixtures.

B. Paint parts after fabrication.

PART III – EXECUTION

3.1 INSTALLATION

A. Setting and Securing: Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's printed instructions and approved Shop Drawings.

B. Support For Recessed and Semi-Recessed Fixtures: Units shall be supported independent from suspended ceiling. Install fixture with support wires at 2 diagonal corners to the structure or building steel.

1. Fixtures of Sizes Less Than Ceiling Grid: Center in the acoustical panel. Support fixtures independently with at least two ¾ inch metal channels spanning and secured to the ceiling tees.

2. Install support clips or screws for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corners.

3. Support wires shall be not less than the support wires for the ceiling system.

C. Lamping: See Schedule on Drawings, or provide standard lamp for the rating of the fixture.

D. Where mounting height for fixtures are not scheduled, coordinate with the Engineer before any installation.

3.2 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Emergency Battery Units Test: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy for a period of not less than 90 minutes to demonstrate proper operation of Emergency Lighting installation. Include the following in tests of emergency lighting

equipment.

1. Duration of supply
2. Low battery voltage shut-down
3. Normal transfer to battery source and retransfer to normal
4. Low supply voltage transfer

C. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

D. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes. The battery test shall be done 10 days prior to final inspection by the State Construction Office. Any unit which fails the test must be repaired or replaced and tested again. Copy of the test report shall be presented to the Engineer of Record at the final inspection and included in the project Operations and Maintenance manuals.

3.3 ADJUSTING AND CLEANING

A. Clean fixtures upon completion of installation. Use methods and materials recommended by manufacturer.

B. Adjust aimable fixtures to provide required light intensities.

END OF SECTION 26 51 00