

Main Entry Enclosure

Alamance County Health Services Center

**319 North Graham Hopedale Road
Burlington, NC 27217**

Alamance County Quote Number: #18-Q007

Commission # 17-31 February 28, 2018



Ricky L. Loman, AIA
603 Summit Avenue, Suite 102

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Architect
Greensboro, N.C. 27405-7700

Set Number: _____

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DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

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General Construction

Sheet:

Title:

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A1	FLOOR PLAN AND ELEVATIONS
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End of Section



Alamance County

Purchasing Department
124 West Elm Street
Graham, North Carolina 27253
Telephone (336) 570-4072 Fax (336) 570-4069

Randy Clark
Director

March 2, 2018

REQUEST FOR WRITTEN QUOTES

Alamance County is soliciting written quotes to enclose the **Main Entry at the Alamance County Health Services Center located at 319 North Graham Hopedale Road, Burlington, NC 27217**. Quotes will be received until 2:00 pm, March 15, 2018. Quotes shall be hand delivered to the Purchasing Department located at 124 W. Elm Street, Graham NC 27253, Attn: Randy Clark.

Quotes will be opened publically and read aloud. Quotes submitted late will not be accepted.

Quotes must be submitted in a sealed envelope and clearly marked:

Quote: HSC Main Entry Enclosure
Alamance County Health Services Center
Quote #18-Q007
Attn: Randy Clark
Contractor's License Number

This project consists of providing all materials and labor to enclose the existing covered entrance with aluminum framing and glass, install new automatic sliding doors, a single hinged aluminum exterior door, install new exit and emergency lighting, a small HVAC unit, and repair to existing concrete, drywall, and acoustical tile ceiling systems in the area of work. See the attached plans and specifications for a detailed Scope of Work and project requirements.

Quotes shall be submitted on the bid forms provided within the specification documents and the signature on the forms must be that of an authorized representative or officer of the company. Two signed copies shall be included in the envelope. Submission of quotes by email is not acceptable.

Bidders must be properly licensed as may be required for this type work in accordance with Section 87 of the North Carolina General Statutes.

Any permits that may be required for this type work are the responsibility of the contractor. There is a pre-bid meeting scheduled at 10:00 AM, March 8, 2018 located on site at 319 North Graham Hopedale Road, Burlington, NC 27217. Any questions thereafter must be submitted in writing and addressed to:

Mr. Ricky L. Loman, AIA Architect
603 Summit Avenue, Suite 102
Greensboro, NC 27405
Phone/FAX (336) 273-7999
email: rloman@bellsouth.net

Access to the facility during other times must be scheduled with Mr. Buddy Whitesell, Alamance County Facilities Director. Phone numbers are (336) 570-4198 and (336) 269-4554 email: Buddy.Whitesell@alamance-nc.com

No quote may be withdrawn after the scheduled bid closing time for a period of 90 days.

Bidders must provide evidence of insurance in the minimum amount of \$1 Million for General Liability (each occurrence), Commercial Auto Liability Coverage, Personal Liability Coverage (\$2 Million) and Workers Compensation (min \$500,000 per accident). Certificates of Insurance shall be provided prior to award of any contract. Additional information will be provided to the successful company.

Bid bond or Performance & Payment bonds will not be required for this project.

Minority businesses are encouraged to participate in this project.

Alamance County awards public contracts without regard to race, religion, color, creed, national origin, sex, age or handicapped condition as defined by North Carolina General Statutes, Section 168A-3.

Alamance County reserves the right to reject any or all bids presented and to waive any informalities and irregularities.

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INSTRUCTIONS TO BIDDERS
(Informal Construction Projects)

1. CONTRACTOR'S LICENSES. - All applicable state and local licenses will be required.
2. BUILDING PERMITS - Will be the responsibility of the successful contractor.
3. INSURANCE:
 - a. **Workers' Compensation Insurance**

The Contractor shall maintain during the life of his contract Workers' Compensation insurance for all of his employees employed at the site of the project ,and, in case any work is sub-let, the contractor shall require the sub-contractor similarly to provide Workers' Compensation insurance for all the latter's employees employed at the site of the project, unless such employees are covered by the protection afforded by the contractor.
 - b. **Public Liability Insurance**

The Contractor shall maintain public liability insurance covering his liability for bodily injury and property damage which may arise from his operations, contractual obligations, products and completed operations, as well as operations performed by independent contractors, in not less than the following amounts:

 1. A combined single limit (CBL) of \$1,000,000 each occurrence, or
 2. A \$1,000,000 limit for Bodily Injury Liability, and \$1,000,000 limit for Property Damage Liability.

An occurrence form of policy will be required, and the certificate of insurance submitted by the Contractor must be personally signed by a resident licensed agent of each of the companies listed on that form.
 - c. **Certificate of Insurance**

Each contractor shall furnish the Owner a certificate of insurance showing that the required workers' compensation and public liability insurance are carried by the Contractor. The certificate of insurance should show that it is issued to or at the request of the Alamance County Purchasing Department, Graham, North Carolina. All insurance carriers shall be licensed to do business in North Carolina or approved to issue insurance coverage by the Commission of Insurance of North Carolina.

The Certificate of insurance shall include substantially the following provision: The insurance policies to which this certificate refers shall not be altered or canceled until after ten (10) days written notice of such cancellation or alteration has been sent by certified mail to the Alamance County Purchasing Department, Graham, North Carolina.
 - d. Alamance County reserves the right to reject any carrier of insurance shown in the certificate of insurance by the Contractor on the grounds of poor claim service or financial responsibility.
4. SAFETY - Contractor shall be familiar, and in complete compliance, with OSHA requirements and regulations.
5. EXAMINATION OF CONDITIONS:
 - a. Before submitting a bid, each Bidder shall examine the site. He shall familiarize himself with the site conditions and with the specifications. He shall investigate such local conditions as rules and regulations, availability and cost of labor, etc. which may affect the performance of the contract. No allowances will be made for his failure to do so. No consideration will be given at a later time for alleged misunderstanding as to requirements of work, materials to be furnished, or conditions required by nature of the site.
 - b. Items incorrect or obviously omitted from the specifications by oversight or error shall be called to the attention of the Owner's representative, who will send written instructions to all Bidders.
6. QUALIFICATIONS - Bidders must have a successful record of experience in the type of work specified.

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7. PAYMENT TO THE CONTRACTOR - Payment will be made in one lump sum thirty (30) days after the work has been successfully completed and every provision of the specifications complied with to the Owner's satisfaction unless prior approval is given for the submission of progress payments. Evidence that all accounts are paid in full and three copies of the warranties and guarantees will be required to be submitted to the Owner prior to approval of the final payment.
8. FINAL CLEANING:
 - a. The contractor shall at all times keep the premises free from accumulation of waste materials.
 - b. The Contractor shall be responsible for removing all the construction debris from the premises and disposing of the same at a dump location of his choice
 - c. Restore any grassy areas and replace any sidewalks or pavement damaged during construction.
9. THE BIDDER hereby declares that the only person or persons interested in the proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a Bid or Proposal; and that is in all respects fair and in good faith without collusion or fraud. The Bidder further declares that he has examined the site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done; that he has examined the specifications for the work and has satisfied himself relative to the work to be performed.
10. ALAMANCE COUNTY reserves the right to reject any or all bids and to waive any informalities or technicalities. All projects are awarded contingent on the availability of funds.
11. TAXES – Taxes, if required or included, should be reported separately.
12. DEFAULT AND PERFORMANCE BOND - In case of default by the contractor, Alamance County may procure the articles or services from other sources and hold the contractor responsible for any excess cost occasioned thereby. Alamance County reserves the right to require performance bond or other acceptable alternative guarantees from successful bidder without expense to the school system.
13. SUBCONTRACTOR- Subcontractors may not be used unless receiving prior written approval from The Alamance County Maintenance Department.
14. DISPUTE RESOLUTION -All Construction and Repair projects in the amount of \$15,000 or more are subject to the requirements of NCGS 143-128(f1).
15. SPECIAL REQUIREMENTS REGARDING CRIMINAL BACKGROUND:
 - a. Criminal Background Investigations of individuals working on county property (sites occupied with employees and sites not occupied with employees).
 - b. At a minimum, the contractor shall obtain a complete North Carolina statewide criminal background investigation for all employees and subcontractors who will work on this project. In the event that the contractor or subcontractor is from out of state, the criminal background investigation shall be broadened to include their home state, as well as the state of North Carolina as outlined above. The company providing such information must be recognized by local law enforcement agency as qualified to do so. All costs associated with these criminal background checks is the responsibility of the contractor.

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Each prime contractor will be responsible for all their employees and all of their subcontractors working under them.

On sites that are occupied, a daily sign-in sheet will be presented by each prime contractor to the building manager. This list will contain the name of each person on site and the company for which they work.

The “Addendum to Proposal/Agreement Between Alamance County and the Contractor” appended to this section referencing use of the E-Verify system or I-9 Documentation must be attached to the construction agreement along with the Iran Divestment Act Certification affidavit included in these specifications.

- c. Any individual with the following criminal convictions or pending charges will **NOT** be permitted on any county project or property.
 - 1. Child Molestation or Abuse or indecent liberties with a child;
 - 2. Rape;
 - 3. Any Sexually Oriented Crime;
 - 4. Drugs: Felony use, possession or distribution;.
 - 5. Murder, manslaughter or other death related charge; or
 - 6. Assault with a deadly weapon or assault with intent to kill.

- d. Any individual with a prior conviction or pending charges contained in the aforementioned list, shall be banned (not allowed) from any county project or property.

Each person on site must wear a plastic laminated identification badge that identifies the name of the company and the person’s name. These badges are to be computer produced at a font large enough to be clearly visible. All costs associated with these criminal background checks is the responsibility of the contractor. The ID badge template will be made available to the successful prime contractors at the Pre-Construction Meeting.

Alamance County, may, at any time, request verification of criminal background investigation for any employee or subcontractor on school property.

16. REQUIRED WORK SCHEDULE:

Prior to beginning work, the contractor is to provide a schedule that defines the construction effort. Work is to be completed as per the approved project schedule, unless revised by the Alamance County Maintenance Department. Work may begin when a Notice to Proceed is given. The Notice To Proceed may be a phone call from a Alamance County Maintenance Department Representative, with a verbal PO number, followed by a written notice to proceed and/or actual PO.

17. PERMITS:

The Contractor is responsible for obtaining all required permits and for having and insuring all applicable certification requirements are met prior to the start of the work. The cost of any required permits is also the responsibility of the Contractor.

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18. ASBESTOS:

The Contractor is advised that no representation is made by the Owner that the work site is completely free of asbestos-containing materials. Reasonable steps have been taken by the Owner to identify any such asbestos-containing materials; however, the Contractor is hereby notified that if any suspect materials are encountered, the following steps are to be taken:

1. Stop work immediately.
2. Rope off the work site to prevent anyone from contacting suspect materials. Contact the Owner and describe what was found.
3. Comply with requirements of 29 CFR Part 1926 Occupational Safety and Health Standards for the Construction Industry.

19. SITE CONDITIONS, UNDERGROUND UTILITIES:

It is the responsibility of the Contractor to become familiar with the specific conditions at the worksite. The Contractor is responsible for locating and marking all public and private underground utilities. Once marked, it is the Contractor's responsibility to maintain markings for reference. If the Contractor damages any underground utility, the Contractor must arrange for repair of the damage at their cost.

The Contractor must also isolate the work site as much as possible from students/public by means of ropes, fencing, barricades, etc.

DIGGING - All digging shall be done Monday-Friday from the hours of 7:00 am until 4:00pm UNLESS other times are approved by project manager.

20. SOIL DISRUPTION:

1. The Contractor will ensure that all holes are refilled and compacted (minimum 95%) in 6" intervals and the area disrupted by his effort is leveled and re-seeded.
2. The Contractor shall avoid driving across sidewalks, grass or other non-vehicular areas. Where vehicular access cannot be avoided, the Contractor shall be responsible for repairing and reseeding these areas to the Owner's satisfaction. The Contractor shall notify the building manager or the maintenance department representative prior to crossing non-vehicular areas.

21. TRASH:

All trash, construction debris, etc, should be removed from the site daily or stored safely in a container belonging to the contractor.

22. DAMAGES:

The contractor is responsible for repairing all damages his organization causes to any Alamance County property during the performance of the work.

23. CHANGE ORDERS:

When unforeseen conditions require modifications to the Contract, the Contractor must propose changes by submitting a request for a change to the Owner. This request must include the following:

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1. A statement outlining the reasons for the change and the effect of the change on the contract total cost and time for completion. The request is to provide a detailed description of the proposed change.
2. A detailed list of required products, quantities needed, and unit cost, with the total amount of purchases to be made.
3. Applicable taxes, delivery charges, equipment rental, and amounts of trade discounts

The Alamance County Maintenance Department representative must accept the proposed changes and give a notice to proceed to the Contractor prior to any Change Order work being performed.

24. PROJECT DELAYS:

The Contractor will be responsible for contacting the county maintenance department project manager when a delay is anticipated. The PM will evaluate the cause and make a recommendation to his/her supervisor if the delay justifies an extension of time in completing the project. If the delay is deemed warranted and an extension is granted, the PM shall notify the Contractor in writing.

25. PROJECT DEFAULT:

If the Contractor defaults or neglects to carry out the work in accordance with the project specifications or fails to provide adequate manpower, material, or resources within 48 hours of written notice of default by Owner, the county may correct such deficiencies, or provide adequate manpower, material, and resources (including supplementing the Contractor's workforce). In such cases, an appropriate change order shall be issued deducting from current or future payments due the Contractor to include the actual cost of correcting such deficiencies, or providing adequate manpower, material, and resources including all other expenses the county incurs. Alamance County may withhold payments to the Contractor until the cost of correction is determined. If payments due to the Contractor are not sufficient to cover such amounts, the Contractor's surety shall pay the difference to the county.

26. INSPECTIONS:

The contractor is to notify the Alamance County project manager of all inspection dates and times involving the services of all certifying agencies.

The contractor shall determine, within the specified contract period, when work is completed and ready for owner's acceptance inspection. At the acceptance inspection, the school system representative will, if warranted, record a list of discrepancies that will be used to identify work that is incomplete or not in accordance with the specifications. This list of discrepancies is to be known as the punch list. At conclusion of the final inspection, the owner (Alamance County) shall make the following determination:

1. That the project is complete and accepted.
2. That the project is accepted subject to resolution of the punch list. Correction of work not in accordance with specifications or determined to be unacceptable shall begin within 48 hours after receipt of notice from the owner or inspector and shall be pursued to completion.
3. That the project is not accepted and another date for a final inspection will be identified.

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27. WORKSITE CONDUCT:

The contractor shall at all times obey the rules and restrictions of the Alamance County Maintenance Department pertaining to conduct while on county property. NO TOBACCO PRODUCTS, ALCOHOLIC BEVERAGES OR WEAPONS ON COUNTY PROPERTY.

Due to the commitment to a drug and alcohol free workplace, it is also the policy of Alamance County that the work environment shall be free of the presence of alcoholic beverages or unlawful controlled substances and that contractor's employees shall perform their job assignment(s) safely, efficiently, and without the adverse influence of alcohol or controlled substances. Therefore, the county prohibits all employees from possessing, using, manufacturing, dispensing, selling, distributing, or being under the influence of illegal drugs and from the use, sale, distribution or possession of drug paraphernalia. All employees are prohibited from unlawfully possessing, using, manufacturing, dispensing, selling, distributing, or being under the influence of alcohol.

28. SPECIAL REQUIREMENT:

When on county property, the contractor and all persons performing work for him shall wear some form of identification showing the company name or logo, either by identification badge or by clothing (shirts, uniforms, hats) with the company name or logo.

Addendum to
Proposal/Agreement Number _____

Between

Alamance County

and

The above referenced Proposal/Agreement is hereby amended by adding a new paragraph as follows:

E-Verify or I-9 Documentation.

The parties hereby stipulate that the contractor shall use the E-Verify system established and maintained by the United States Department of Homeland Security or produce I-9 documentation to ensure that all contractor and subcontractor employees meet the employment eligibility requirements as set forth in the federal laws, rules and regulations and further that the contractor and subcontractor shall maintain E-Verify or I-9 records and make them immediately available upon the written request of Alamance County.

Contractor

By: _____

Alamance County

By: _____

DIVISION 00. PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 002113 INSTRUCTIONS TO BIDDERS

1. **FINAL TIME FOR RECEIVING PROPOSALS:**
2:00 P.M., local time, March 15, 2018.
2. **PLACE FOR RECEIVING PROPOSALS:**
Alamance Facilities Purchasing Department, 124 W. Elm Street, Graham, N.C. 27253.
3. **PLACE FOR OPENING PROPOSALS:**
Alamance Facilities Purchasing Department, 124 W. Elm Street, Graham, N.C. 27253.
4. **PROPOSALS RECEIVED BEFORE TIME OF OPENING:**
Will remain unopened until time for receiving bids.
5. **PROPOSALS RECEIVED AFTER TIME FOR OPENING:**
Will not be accepted.
6. **OPENING OF PROPOSALS:**
Publicly opened.
Tabulations will be sent to all bidders.
7. **EXAMINATION OF DRAWINGS AND DOCUMENTS:**
Should a bidder find discrepancies in, or omissions from, the drawings or documents, or should he be in doubt as to their meaning, he should at once notify the Architect, who will send written instructions to all bidders. Neither the Owner nor the Architect will be responsible for any oral instructions.
8. **EXAMINATION OF THE SITE:**
Before submitting a proposal, each bidder should visit the site of the work, fully inform himself as to all existing conditions and limitations, and shall include in the proposal a sum to cover all items included in the contract.
9. **PREBID MEETING:**
A prebid meeting will be held at the site of the work at **10:00 AM, local time on March 08, 2018.**
10. **QUESTIONS AND CLARIFICATIONS:**
Bidders will have until **5:00 P.M. local time, Monday, March 12, 2018** to submit questions to the architect for clarification and inclusion in a project addendum to be issued to all bidders.
11. **ADDENDA:**
Any addenda issued and received during the time of bidding shall be included and acknowledged in the proposal and in closing a contract, they will become a part thereof.
12. **ACCEPTANCE OR REJECTION OF PROPOSALS:**
 - A. The competency and responsibility of bidders and their proposed subcontractors will be considered in making the award. The Owner does not obligate himself to accept the lowest or any other bid.
 - B. The Owner reserves the right to hold proposals for 90 days before award or rejection, and to reject any or all bids.
13. **PAYMENTS:**
Refer to the Alamance County Instructions to Bidders (Informal Construction Projects) for payment terms.
14. **FIRE INSURANCE:**
As a condition precedent to effectuation of the contract, furnish certificate of coverage of fire insurance for all the work performed by this contract.

DIVISION 00. PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 002113 INSTRUCTIONS TO BIDDERS (CONTINUED)

15. CONTRACTOR'S LICENSE:

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 at least LIMITED BUILDING.

16. TIME FOR COMPLETION:

- A. The work included under this contract to be substantially complete no later than **Sixty (60) days** after issuance of the contract for construction.
- B. If the Contractor is delayed at anytime in the progress of his work by changes ordered in the work; abnormal weather conditions; or any causes beyond the Contractor's control or any other causes deemed justifiable by the Architect, then the contract time shall be reasonably extended in a written Change Order from the Architect.
- C. The Contractor is to notify the Architect within one day of any delays caused by conditions beyond his control. A written report shall be submitted with the Contractor's application for payment each month listing all requests for contract time extensions for that month. No extensions in time will be allowed if not handled in this manner.

17. USE OF SITE:

- A. The Contractor will have access and control of the area of work for demolition and construction purposes during normal business hours Monday through Friday. Access is possible at other times but must be approved by the site administrator and the Alamance County Maintenance Department. Owner must have use of the facility throughout the construction period. Utilities will be provided by the Owner and must be kept in operation during business hours.
- B. Daily work hours are normally limited to the hours between 7:00 AM and 6:00 PM, Monday through Friday, work hours other than these times should be cleared in advance with the Owner's representative. Weekend work and extended work day hours may be permissible with written permission of the Owner. The use of generators, mechanical equipment, and other work items generating noise are to be limited to times outside normal business hours, unless approved by the Owner.

18. PREPARATION OF PROPOSALS:

To be entitled to consideration, proposals must be made in accordance with the following instructions:

- A. Proposals shall be made upon the proposal form provided, and all blank spaces in the forms shall be filled; numbers shall be stated both in writing and in figures; the signature shall be long hand; and the completed forms shall be without interlineation, alteration, or erasure.
- B. Proposals shall not contain any recapitulation of the work to be done. No oral, telegraphic, or telephonic proposals or modifications will be considered.

DIVISION 00. PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 002113 INSTRUCTIONS TO BIDDERS (CONTINUED)

19. PROPOSALS:

Proposals may be transmitted to the Owner as follows:

- A. Hand Delivery:
Address to Randy J. Clark, Alamance County Purchasing Manager and deliver enclosed in an opaque envelope marked as follows:

**"Main Entry Enclosure - Alamance County Health Services Center
Quote #18-Q007
Alamance County Office Building
124 West Elm Street
Graham, North Carolina 27253**

Attn: Randy Clark"

Include North Carolina Contractor's license on envelope.

End of Section

Form of Proposal
Main Entry Enclosure

Alamance County Health Services Center

319 North Graham Hopedale Road
Burlington, North Carolina 27217

QUOTE #18-Q007

Bidder: _____

Date: _____

The undersigned, as Bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is / or named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company, or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be preformed.

The Bidder proposes and agrees if this proposal is accepted to contract with the Alamance County Maintenance Department (Owner), in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the fabrication and delivery of the project "Main Entry Enclosure, Alamance County Health Services Center, 319 Graham Hopedale Road, Burlington, North Carolina 27217" in full and complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the Owner, with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and other contract documents, for the sum of:

Single-prime contract:

BASE BID:

Dollars \$ _____

ADD ALTERNATE #1: (Include modular carpet tile in the enclosed entry);

Dollars \$ _____

TIME FOR COMPLETION:

The bidder further proposes and agrees hereby to commence work under this contact upon receipt of a contract for construction and/or purchase order and a written notice to proceed from the Owner, and shall substantially complete all work Sixty (60) days after issuance of the contract for construction.

ADDENDA:

The following addenda were received and used in computing this bid:

	Date	Initial		Date	Initial
Addendum No. 1:	_____	_____	Addendum No. 4:	_____	_____
Addendum No. 2:	_____	_____	Addendum No. 5:	_____	_____
Addendum No. 3:	_____	_____	Addendum No. 6:	_____	_____

RESPECTIVELY SUBMITTED this _____ day of _____, 20 __.

(Name of firm or corporation making bid)

By: _____

Title: _____
(Owner/Partner/President/Vice President)

WITNESS: (Proprietorship/Partnership)

Address: _____

By: _____

License No. _____

Federal ID No. _____

ATTEST: (Corporation)

By: _____

Title: _____
(Corp. Secretary or Asst. Secretary Only)

(CORPORATE SEAL)

**IRAN DIVESTMENT ACT CERTIFICATION
REQUIRED BY N.C.G.S. 143C-6A-5(a)**

As of the date listed below, the vendor or bidder listed above is not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4.

The undersigned hereby certifies that he or she is authorized by the vendor or bidder listed above to make the foregoing statement.

Signature: _____ Date:

Printed Name : _____ Title:

Notes to persons signing this form:

N.C.G.S. 143C-6A-5(a) requires this certification for bids or contracts with the State of North Carolina, a North Carolina local government, or any other political subdivision of the State of North Carolina. The certification is required at the following times:

- When a bid is submitted
- When a contract is entered into (if the certification was not already made when the vendor made its bid)
- When a contract is renewed or assigned

N.C.G.S. 143C-6A-5(b) requires that contractors with the State, a North Carolina local government, or any other political subdivision of the State of North Carolina must not utilize any subcontractor found on the State Treasurer's Final Divestment List.

The State Treasurer's Final Divestment List can be found on the State Treasurer's website at the address www.nctreasurer.com/Iran and will be updated every 180 days.

DIVISION 00. PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 007200 GENERAL CONDITIONS

1. The "General Conditions of the Contract for Construction", AIA Document A201, 2007 Edition; Articles 1 thru 14 inclusive are hereby made a part of the contract documents to the same extent as if herein written out in full.
2. Copies of this document may be purchased from the American Institute of Architects, 1735 New York Avenue, N.W., Washington, D.C. 20066.
3. Copies of this document are available for inspection in the Architect's office and may be reviewed upon request.
4. Where any article is supplemented under Section 007300, the AIA provisions of such article shall remain in effect and the supplemental provisions shall be considered as added hereto.
5. Where any article is amended, voided, or superceded under Section 007300, the AIA provisions of such article not so specifically amended, voided, or superceded shall remain in effect.

STATE OF NORTH CAROLINA
MAIN ENTRY ENCLOSURE - ALAMANCE COUNTY HEALTH SERVICES CENTER
AGREEMENT
COUNTY OF ALAMANCE

This AGREEMENT, made this the _____ day of _____ 2017, by and between ALAMANCE COUNTY, a political subdivision of the State of North Carolina, 201 West Elm Street, Graham, North Carolina, 27253 hereinafter called the Owner, and

_____, _____, North Carolina, hereinafter called the Contractor:

WITNESSETH:

WHEREAS, the Owner has need to enclose the main entry at the Alamance Country Health Services Center, 319 Graham Hopedale Road, Burlington, NC 27217, hereinafter called the Project; and

WHEREAS, the Owner desires to employ the Contractor to complete the Project in accordance with the requirements set forth in the attached Request for Written Quotes dated _____, 2018 a copy of which is attached to this Agreement as Exhibit A and incorporated herein as if set forth; and

WHEREAS, the Contractor has set forth its proposal for the Project dated _____, 2018, a copy of which is attached to this Agreement as Exhibit B and incorporated herein as if set forth; and

NOW, THEREFORE, in consideration of these premises and of the scope of work, terms and conditions herein set forth in this Agreement, including Exhibits A & B, the parties agrees as follows:

The Contractor agrees to furnish and perform for the Project as follows:

1. General. Contractor shall be properly licensed for the work in accordance with Section 87 of the North Carolina General Statutes. General Contractors shall have a general license classification for at least LIMITED BUILDING in accordance with the Rules & Regulations of the North Carolina Licensing Board for General Contractors.
2. Insurance Requirement. Contractor shall provide evidence of insurance in the minimum amount of \$1 Million for General Liability (each occurrence), Commercial Auto Liability Coverage, Personal Liability Coverage (\$2 Million) and Workers Compensation (min \$500,000 per accident). Certificates of Insurance shall be provided prior to award of any contract.
3. Scope of Work. Contractor shall furnish all materials and labor for the main entry enclosure at the Alamance County Health Services Center. The building is located at 319 North Graham Hopedale Road, Burlington, North Carolina 27217.

A brief description of work in the Project follows:

1. Removal of selected areas of concrete, wood framing, existing aluminum door and frame, and glazing. Install new aluminum storefront framing and glass, new hinged aluminum door, ceiling access panel, and automatic sliding aluminum doors & frames. Repair existing drywall ceiling, remove and replace existing acoustical tile ceiling in selected areas as necessary to install new HVAC piping and electrical conduit and wiring. and install new ceiling grid, reinstall salvaged ceiling tiles and new tiles as needed. Repair the carpet tiles, and paint the walls. All as shown on the drawings and described in the project specifications.

2. Project start date is _____, 2018. Project duration should not exceed 60 days from date of award.

3. Contractor shall furnish all labor, supervision, materials and equipment necessary to perform the work for the Project as shown on the plans and described in the project specifications.

The Owner shall not during such site observations supervise, direct, or have control over the Contractor's work nor shall the Owner have authority over or responsibility for the means, methods, techniques, sequences, or procedures of construction selected by the Contractor, including safety measures.

4. Post Construction Services. Upon completion of the construction of the Project, Contractor will furnish Owner with "Record Drawings" that reflect any changes that were made during the Project; advise and jointly with the Owner administer the enforcement of all guarantees and warranties made by each supplier of sub-contractor under the terms of any such suppliers or sub-contractor's agreement.

5. Compensation. The Contractor shall be compensated for Project services provided herein, on a lump sum basis in the amount of \$_____ upon completion and acceptance of the Project by the Owner.

6. Termination of Contract. In the event this contract is terminated by the Owner, the Contractor shall be compensated for the time spent on the project based on the attached hourly charge rate schedule of those performing said services on the contract.

7. E-Verify. The parties hereby stipulate that the Contractor shall use the E-Verify system established and maintained by the United States Department of Homeland Security to ensure that all Contractor and subcontractor employees meet the employment eligibility requirements as set forth in the federal laws, rules and regulations and further that the Contractor and subcontractor shall maintain E-Verify records and make them immediately available upon the written request of the Owner.

IN TESTIMONY WHEREOF, the County of Alamance and _____, Inc. has caused this contract to be executed in its corporate name by the County Manager, attested by the Clerk, and its corporate seal to be hereunto affixed, and the said _____, Inc. has caused this contract to be executed in its corporate name by its Senior Vice President, attested by its corporate Secretary, and its corporate seal to be hereunto affixed, the day and year first above written.

COUNTY OF ALAMANCE

(SEAL)

By: _____
Bryan Hagood, County Manager

ATTEST:

Tory Frink, Clerk

(SEAL)

_____, INC.
By: _____
President

ATTEST:

Date: _____

Secretary

DIVISION 00. PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 007300 SUPPLEMENTARY GENERAL CONDITIONS

ARTICLE 1:

The Supplementary General Conditions are to supplement, or amend the "General Conditions of the Contract" and intended to address job specific issues.

ARTICLE 2. CONTRACTORS LIABILITY INSURANCE:

Refer to the enclosed "ALAMANCE COUNTY MAINTENANCE DEPARTMENT INSTRUCTIONS TO BIDDERS" for necessary insurance requirements.

ARTICLE 3. PROPERTY INSURANCE 11.3:

Builders risk insurance shall be purchased by the Contractor.

ARTICLE 4. TIME FOR COMPLETION:

- A. The Contractor shall commence all work to be performed under this contract upon receipt of a Purchase Order from the Alamance County Maintenance Department and shall fully complete all work hereunder in accord with the completion date noted in Section 002113 Instructions to Bidders.
- B. If the Contractor is delayed at anytime in the progress of his work by changes ordered in the work; abnormal weather conditions; or any causes beyond the Contractor's control or any other causes deemed justifiable by the Architect, then the contract time shall be reasonably extended in a written Change Order from the Architect.
- C. The Contractor is to notify the Architect and the Owner within one day of any delays caused by conditions beyond his control. A written report shall be submitted with the Contractor's application for payment each month listing all requests for contract time extensions for that month. No extensions in time will be allowed if not handled in this manner.

ARTICLE 5. SPECIFICATION EXPLANATION:

- A. These specifications are of the abbreviated or "streamlined" type and include incomplete sentences. Omissions of works or phrases such as "the contractor shall", "in conformity therewith", "shall be", "as noted on the drawings", "according to the plans", "a". "the", and "all" are intentional. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" appears on the drawings.
- B. All references to known standard specifications shall mean and intend the latest edition of such specifications.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 011100 SCOPE OF WORK

PART 1 - GENERAL

1.01 Work covered by the contract documents:

- A. Work under this contract consists of furnishing labor, materials, and equipment necessary to perform the following work, which includes, but is not limited to:
- B. Division 02 - Existing conditions:
Demolition:
 - 1. Remove existing sections of concrete, wood framing, and drywall ceiling as necessary to install the new work.
 - 2. Remove and reinstall the ceiling tile and grid as required to install new HVAC piping and electrical conduit.
- C. Concrete:
 - 1. New sections of concrete at the entry ways.
 - 2. Concrete reinforcement.
- D. Division 05 - Metals:
Galvanized steel framing where detailed on the drawings.
- E. Division 06 - Carpentry:
New fire retardant wood bracing as shown at the locations of the new aluminum framing.
- F. Division 07 - Moisture Protection:
Caulking and sealants.
- G. Division 08 - Doors, Windows, Glass:
 - 1. New aluminum framing and glazing.
 - 2. New hinged aluminum door.
 - 3. Automatic sliding aluminum doors and frames.
 - 4. Install new ceiling access panel.
 - 5. New glazing.
 - 6. Finished hardware for the new doors.
- H. Division 09 - Finishes:
 - 1. Repair the existing gypsum board ceiling at the main entry.
 - 2. Paint all new and existing drywall surfaces in the area of work.
 - 3. Install vinyl base at areas of new drywall furring.
- I. Division 23 - Heating, Ventilating, and Air-Conditioning:
Install new split system heating and cooling unit.
- J. Division 26 - Electrical:
Install new electrical wiring, conduit, and breakers for the new exit and emergency lights, and to connect power to the new automatic sliding aluminum doors and the split system HVAC unit.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 01. GENERAL REQUIREMENTS

SECTION 012300 ALTERNATES

PART 1 - GENERAL

- 1.10 Related Documents:
Drawings, general provisions of the Contract, including General Conditions, other Division 1 Specification Sections, and all other contract bid documents apply to this Section.
- 1.20 Summary
- A. This Section includes administrative and procedural requirements for alternates.
 - B. Specific requirements of each contract are also indicated in individual Specification Sections, All Bid Documents and on Drawings.
- 1.30 Definitions:
- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
- 1.40 Procedures:
- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
 - B. Notification: Prior to award of the Contract, the Architect will notify each party involved, in writing, of the status of each alternate. The Architect will indicate if alternates have been accepted, rejected, or deferred for later consideration. The Contractor agrees to honor pricing on Bid Alternates for the same length of time as stated for the Base Bid.
 - C. Execute accepted alternates under the same conditions as other work of the Contract.
 - D. Schedule: A Schedule of Alternates is included at the end of this Section. The Bid Documents contain technical requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION

- 3.10 Schedule of Alternates:
- Add Alternate #1: Include modular walk-off carpeting in the new enclosed entry.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 013323 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

- 1.01 Section Includes:
- A. Requirements for information to be provided in submittals.
 - B. Submittal procedures for shop drawings, product data, manufacturer's installation data and samples.
- 1.02 Related Requirements in other Sections:
- A. Product options and substitutions (Section 016000).
 - B. Definitions and additional responsibilities of parties (General Conditions).
 - C. Requirements of individual Sections of Specifications.
- 1.03 Shop Drawings:
- A. Shop Drawings are drawings, sketches, diagrams, or other data prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work. The use of manufacturer's standard catalog details without modification is prohibited.
 - B. Present in a clear and thorough manner. Title each shop drawing with Project name and number, identify each element of drawings by reference to sheet number and detail.
 - C. Identify field dimensions; show relation to adjacent or critical features of work or products.
 - D. Details shall indicate materials to be used by product identification and their relation to as-built conditions. Show all fasteners including size, length, and spacing. Generic details of the membrane manufacturer may be submitted for information but will not be accepted as shop drawings.
- 1.04 Product Data:
- A. Product Data are illustrations, standard schedules, performance capabilities and charts, instructions, brochures, diagrams and other information furnished to illustrate a material, product, or system for some portion of the Work.
 - B. **Submit only pages which are pertinent;** mark each copy of standard printed data to identify pertinent products, referenced to Specification section and Article number. Show reference standards, and performance characteristics; finishes; dimensions; and required clearances.
 - C. Modify manufacturer's standard drawings and information in order to provide information specifically applicable to the work of this Contract. **Delete information not applicable.**
- 1.05 Samples:
- A. Label each sample to clearly identify material and function, and specific specification section which is applicable.
 - B. Samples shall be in triplicate, one to be retained by the Architect, one to be returned to the Contractor and one to be placed on file in the Contractor's field office for comparison to the materials delivered.
- 1.06 Contractor Review:
- A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, manufacturer's catalog numbers, and conformance of submittal with requirements of Contract Documents.
 - B. Coordinate submittals with requirements of work and of Contract Documents. All submittals shall be transmitted to the Architect/Engineer in ample time to prevent delays in the work. Shop drawings shall be submitted in advance of start of work of this project.
 - C. Sign or initial each sheet of shop drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify Architect in writing at time of submittal, of any deviations from requirements of Contract Documents.
 - D. Do not fabricate products or begin work which requires submittals until return of submittal with Architect/Engineer acceptance.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 013323 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES (CONTINUED)

- 1.07 Submittal Requirements:
- A. All Shop Drawings, Project Data, and Samples shall be submitted to the Architect/Engineer, through the Contractor, for review.
 - B. All Shop Drawings for the initial submission shall be submitted in the form of one reproducible copy (sepia media) and two prints for each sheet required. After the Architect/Engineer's review, this reproducible will be returned to the Contractor. Should printed catalog data be required with the submission, four copies shall be submitted. Two copies will be retained by the Architect who will forward one copy to the Owner, and the remainder will be returned to the Contractor.
 - C. Transmit submittals in such sequence to avoid delay in the work or work of other contracts. All such submittals must be accompanied by a transmittal letter indicating:

PROJECT NUMBER AND TITLE
VENDOR'S OR MANUFACTURER'S NAME
LIST OF SHOP DRAWINGS NUMBERS, TITLES & QUANTITIES OF EACH
 - D. Provide 4" x 4" blank space on each submittal for Contractor and Architect/Engineer stamps.
 - E. Apply Contractor's stamp, signed or initialed, certifying to review, verification of products, field dimensions and field construction criteria, and coordination of information with requirements of work and Contract Documents.
 - F. Coordinate submittals into logical groupings to facilitate interrelation of the several items.
 - G. Number of Submittals Required:
 - 1. Shop Drawings: Submit to the Architect/Engineer one (1) reproducible on mylar film and two (2) bluelines.
 - 2. Product Data: Submit the number of copies which the Contractor requires, plus two (2) additional copies to the Architect/Engineer, one of which will be forwarded to the Owner.
 - 3. Samples: Submit the number stated in each specification section but in no case less than two (2) samples shall be submitted.
 - H. Submittals Shall Contain:
 - 1. The date of submission and the dates of any previous submissions.
 - 2. The Project title and number.
 - 3. Contract identification, including names of Contractor, Supplier and Manufacturer.
 - 4. Identification of the product, with the Specification section number.
 - 5. Field dimensions, clearly identified as such.
 - 6. Relation to adjacent or critical features of the work or materials.
 - 7. Applicable standards, such as ASTM or Federal Specification numbers.
 - 8. Identification of deviations from Contract Documents.
 - 9. Identification of revisions on resubmittals.
 - 10. Contractor's stamp "For Approval Only". All submittals not so stamped will not be accepted for review.
 - 11. Contractor's stamp certifying review of submittal by the Contractor.
- 1.08 Resubmittals:
- A. When corrections are necessary and a resubmittal is not requested, two copies of corrected "field use" drawings will be forwarded to the Architect/Engineer for file purposes. Where resubmittal is requested, the Contractor shall make all corrections required by the Architect/Engineer and shall resubmit accordingly.
 - B. Make resubmittals under procedures specified for initial submittals; identify changes made since previous submittal.
 - C. Shop Drawings and Product Data:
 - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal. Clearly indicate any changes which have been made other than those requested by the Architect/Engineer.
 - 2. When stamped for construction, submit two (2) reproducibles to the Architect/Engineer.
 - D. Samples: Submit new samples, as required, for initial submittal.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 013323 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES (CONTINUED)

- 1.09 Architect/Engineer Duties:
- A. Review submittals with reasonable promptness and in accordance with schedule. Transmittal turnaround time shall be approximately seven (7) days after receipt by Architect/Engineer.
 - B. Affix stamp and initials or signature, and indicate requirements for resubmittal, or approval of submittal.
 - C. Return submittals to Contractor for distribution or for re-submission.
- 1.10 Owner's Duties:
- A. Approval or acceptance of Shop Drawings, Product Data or Samples will not preclude the rejection of the completed Work. After approval, no change in brand or make will be permitted unless agreed to in writing by the Owner. The Owner reserves the right to require submission of examples of any materials whether or not required by the Contract Documents.
 - B. The Owner's review of Shop Drawings, Product Data or Samples shall not relieve the Contractor from its responsibility for complying with the Drawings and Specifications, for the accuracy of the Work, nor for the furnishing of all materials required for the Work.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 014300 QUALITY CONTROL

PART 1 - GENERAL

- 1.01 The General Contractor shall maintain quality control over products, services, site conditions, and workmanship, to produce work of specified quality.
- 1.02 The General Contractor shall arrange with material and equipment manufacturers and representatives, if required or requested by the Architect/Engineer, to provide qualified personnel to instruct installers, the Owner's maintenance personnel, and any other parties designated by the Owner on the proper handling, installation, and maintenance of materials and equipment used on this project.
- 1.03 Contractor shall provide a complete set of Drawings, shop drawings, and Specifications at a designated location on the project at all times for the use of all parties.
- 1.04 Telephone:
- A. The Contractor shall provide at this expense, a job telephone, mobile telephone, cell telephone, or pager for project communications for the duration of the contract.
 - B. Local calls shall be paid by the General Contractor, toll calls shall be paid by the party making the call.
- 1.05 Emergency Call List:
The Contractor shall supply the Owner with an Emergency Call List of the Contractor's Supervision responsible for contacting Contractor's personnel in emergencies. The Contractor shall furnish and maintain pagers for the Contractor's Supervision. The Contractor shall be responsible for designating its supervision which will carry the pagers.
- 1.06 PROGRESS SCHEDULE:
- A. The Contractor shall prepare and deliver to the Owner a Progress Schedule satisfactory to the Owner covering all Work on the Project within twenty (20) days after a written Notice to Proceed or of the Contract Date. The Progress Schedule shall describe, in written form, the general step-by-step procedure of Work.
 - B. The Progress Schedule shall show the date when the operation of each Specification Section is to begin and is to be completed and the dollar value to be completed each month. Each Progress Schedule, after the first submission, shall incorporate a progress graph comparing the percent of the total work actually completed by the Contractor against that anticipated by the Progress Schedule. The Progress Schedule shall be updated bimonthly unless the Owner requires more frequent revision, in CPM format.
 - C. If the Contractor at any time knows or has reason to believe that the delivery of any item of material or equipment or the shortage of qualified labor or delays caused by others or the occurrence of any other difficulty may cause a delay in carrying out the approved order of Work of the Progress Schedule, the Contractor shall notify the Architect in writing within three (3) days of acquiring such knowledge, but in any event, within three (3) calendar days of the commencement of the delay.
- 1.07 Work found to be in violation of the specifications, or not in conformance with acceptable construction practices, shall be subject to rejection including complete removal and replacement with new material at the Contractor's expense.
- 1.08 Discrepancies:
If during the performance of the Work, the Contractor discovers errors or discrepancies in the Drawings or Specifications, then the Contractor shall promptly bring these to the attention of the Architect/Engineer in writing which shall promptly reconcile such errors or discrepancies. The Owner will not be liable for any costs incurred by the Contractor due to such errors or discrepancies if the Contractor proceeds with the Work in question without the written approval of the Architect/Engineer.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

- 1.01 Utilities/Equipment:
- A. Use of existing utilities, power and/or water will be furnished by the Owner for his work. Necessary connections to be by the Contractor.
 - B. Should usage become excessive, as determined solely by the Owner's representative, the Contractor shall pay City rates for the utility usage.
- 1.02 Ventilation:
Provide, as required, facilities to maintain specific storage conditions as described within this specification and as recommended by materials manufacturers for use in construction.
- 1.03 Sanitary Facilities:
- A. Toilets shall be designated for use by the Owner for use by the contractor and shall be kept in a clean and sanitary condition.
 - B. Failure to adequately maintain the Owner's facilities may result in revocation of this privilege and require temporary toilet facilities be furnished for the remainder of the project.
- 1.04 Construction Aids:
- A. Contractor shall provide scaffolding and ladders for access to roof and high work areas at all times during construction. Scaffolding and ladders shall meet all OSHA safety requirements. Contractor shall provide ladders for access to all adjacent work areas. Existing facilities of the Owner outside the area of construction may not be used for storage during construction.
 - B. Construction cranes shall be permitted on site only at times approved by the facility manager.
 - C. All existing entrances and/or fire exits are to be maintained by the Contractor during the period of construction. The contractor shall provide accident prevention signage per NC OSHA requirements.
- 1.05 Use of Site:
- A. **The facility is to remain in operation during construction, and work during weekends and after normal business hours is to be anticipated.**
 - B. The Contractor shall be permitted access to the facility on the days noted at the prebid meeting and during approved business hours until the project completion date as long as the operation of the facility is not impaired. Access at all times must be approved by the Alamance County Maintenance Department and the facility manager.
 - C. The Owner should be advised at least 24 hours prior to commencement of any work which could affect facility operations and coordinate all such work with the owner's representative.
 - D. Utilities that effect use of the facility by the Owner are to be kept in operation, accidental damage to existing systems designated to remain operational must be corrected immediately by the Contractor after notification has been given to the Architect and the Owner. If damages are not corrected in a timely manner, the Owner reserves the right to make the necessary repairs and deduct this expense for the contract amount.
- 1.06 Cleaning During Construction:
- A. The Contractor shall at all times, maintain the Owner's premises, property, and the Project site in a neat and orderly condition, free from accumulations of waste materials and rubbish during entire Project period. During the execution of the Work, adjoining areas shall not be littered or obstructed any more that necessary for the performance of the Work. The Contractor shall have the responsibility for removing and disposing of all cartons, crates, trash and all flammable waste materials from the Work areas and for complying with all codes and regulations pertaining to the disposal of debris.
 - B. Residue and debris from construction operations shall not be allowed to accumulate and shall be removed from the Site and disposed of daily, unless prior arrangement is made with the Architect/Engineer and the Owner's Representative.
 - C. Project debris and litter shall be disposed of in Contractor's dumpsters. The use of the Owner's trash bins and dumpsters is prohibited.
 - D. Streets and sidewalk adjacent to the site shall not be used to store debris or construction materials without prior approval. All areas used for construction staging shall be

DIVISION 01 GENERAL REQUIREMENTS

SECTION 015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (CONTINUED)

approved in advance.

- 1.07 Project Security
1. Contractor shall provide all necessary security means to protect his work, materials, tools, and construction equipment from vandalism, theft, and fire. Provide fire watch when using kettles and torches.
 2. Private security services shall be supplied by the contractor as he deems necessary. Any security service set up by the contractor shall be approved by the Owner.
 3. The contractor shall be responsible for replacement of his materials, machinery, equipment, tools and supplies due to theft or mysterious disappearance.
 4. Contractor shall be responsible for placing identifying markings on all tools, equipment and job boxes. Contractors name shall be clearly marked on all job tool storage containers.
 5. The Contractor shall be responsible for scheduling and coordination all work to prevent damage to the existing building by inclement weather, or by unauthorized entry during unoccupied periods and shall, where necessary, to control and prevent such damage or entry, install temporary closures for openings.
- 1.08 Smoking:
Smoking privileges will be as approved by the Owner.
- 1.09 Firearms:
No firearms shall be allowed on Owner's property.
- 1.10 Worker Conduct:
1. If the conduct or performance of any of the Contractor's personnel, Sub-Contractor, material vendor or any other person performing work for the Contractor, or is otherwise on the Owner's property as a result of the Contractor's work, is improper, inappropriate, or is not in strict accordance with the Contract Documents, the Contractor shall remove such persons from the Work.
 2. Long pants and sleeved shirts are required to be worn at all times. Personnel wearing clothing with obscene designs or profane language will be asked to change clothes or be required to leave the site.
 3. Contractors personnel are prohibited from having firearms or drugs in their possession while on the Owner's property.
- 1.11 Existing Building Exiting:
All accessible entrance and/or fire exits are to be maintained by the general contractor during the period of construction.
- 1.12 Removal of Temporary Utilities and Facilities:
General Construction Contractor shall remove all temporary utilities and facilities at the end of the construction period, earlier with the approval of the Architect and Owner's Construction Project Manger. Removal of temporary utilities and facilities to be coordinated with the Owner's Representative.
- 1.13 Work Site Restrictions:
Working Hours:
- A. The contractor may establish a working schedule of his own choosing for the portions of construction involved in the project that do not require interruptions of utility services (electric, water, steam, etc.) to the facility facilities. The contractor shall submit to the Owner his regular daily work schedule, and shall notify the Owner in advance of any deviations from the schedule. The Owner reserves the right to limit the contractor's activities when they conflict with the Owner's operations. The Owner will solely approve the scheduling of all interruptions of utilities to the building or site facilities.
 - B. Daily work hours:
 1. Hours of work shall generally be from 7:00 AM until 6:00 PM, Monday through Friday.
 2. Weekend work and extended work day hours may be permissible with written permission of the Owner.
 3. The use of generators, mechanical equipment, and other work items generating noise may be restricted within certain work hours.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (CONTINUED)

- 1.14 Project Safety:
- A. It will be the Contractor's responsibility to maintain strict project safety standards and at all times take extreme caution to protect the safety of the public.
 - B. No unattended ladders may be left in place.
 - C. Area around all work must be roped-off with clear, highly visible, warning signs posted.
 - D. Protective measures must be maintained in all areas where work will be occurring that could endanger the safety of the public.
 - E. Scheduled times for deliveries, crane operation, and removal of debris will need to be coordinated with the local facility managers in order to cause the least amount of disturbance to facility activities.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 016000 PRODUCT REQUIREMENTS

PART 1 - GENERAL

- 1.01 Products:
- A. Products include materials, equipment and systems.
 - B. Comply with specifications and referenced standards as minimum requirements.
 - C. Do not use materials and equipment removed from existing structure, except as specifically required or allowed by Contract Documents.
- 1.02 Co-Operation:
- A. The Contractor and all Sub-Contractors shall co-ordinate their work with all adjacent work and shall cooperate with all trades to facilitate general progress of their work.
 - B. It is the responsibility of all the Contractors to keep the Architect and the Owner fully informed of work schedules and to contact the Architect and the Owner at least 24 hours prior to commencement of any phase of work that may affect any of the Owners on site activities.
- 1.03 Workmanship:
- A. Work shall be performed by persons qualified to produce workmanship and quality specified.
 - B. The Job Foreman shall provide full-time supervision. Job Foreman must speak and communicate in English. At no time shall mechanics and laborers be left on-site without supervision of the Job Foreman without notifying the Architect/Engineer.
 - C. The Contractor shall appoint a suitably qualified and competent Superintendent/Project Manager to supervise all of the Work on site. Where the extent of the Work is such that a full time Superintendent/Project Manager is not justified, the Contractor's Foreman is to be appointed to oversee the Work of the others, attend Owner's meetings and to be the Contractor's representative on site for the purpose of making on-site decisions.
- 1.04 Personnel:
- A. If the conduct or performance of any Subcontractor, material-vendor or any other person or entity performing Work under a contract or agreement with the Contractor is improper or is not in strict accordance with the Contract Documents, the Contractor shall terminate the contract or agreement of such Subcontractor, material-vendor, person or entity and remove it from the Work. The Contractor shall have the responsibility of ensuring that a termination provision setting for the foregoing agreement is included in each contract, purchase order, Subcontract or service agreement into which it enters with respect to the Work.
 - B. If the conduct or performance of any of the Contractor's personnel is improper or is not in strict accordance with the Contract Documents, the Contractor shall remove such persons from the Work.
- 1.05 Materials:
- A. All materials shall be new and of the quality specified. Workmanship shall be of the highest caliber of the particular trade involved. Also, except as exceeded or qualified by the Specifications, workmanship shall be as stipulated in written standards of recognized organizations of institutes of the respective trades.
 - B. Should the Specifications and Drawings fail to particularly describe the material or kind of goods to be used in any place, then it shall be the duty of the Contractor to make inquiry of the Architect/Engineer for what is best suited. The material that would normally be used in this place to produce first quality finished Work shall be considered a part of the Contract.
 - C. Materials as required by this Contract shall be provided by one manufacturer for each item unless specified otherwise or unless exception is made by the Architect/Engineer.
 - D. Materials Containing Asbestos:
No materials containing asbestos are to be used on this project. If the Contractor encounters any such materials other than what is noted on the drawings or in the specifications for removal, or if any such materials are submitted for approval, he should at once contact the Architect who will authorize removal or replacement.
- 1.06 Manufacturer's Instructions:
Work shall be performed in accordance with the Material Manufacturer's specifications or as modified by Contract Documents. Conflicts between these specifications and the Materials

DIVISION 01 GENERAL REQUIREMENTS

SECTION 016000 PRODUCT REQUIREMENTS (CONTINUED)

- Manufacturer's specifications shall be brought to the attention of the Architect/Engineer prior to beginning construction. Work as relates to conflict shall not proceed until conflicts are satisfactorily resolved by Architect/Engineer.
- 1.07 Transportation and Handling:
- A. Transport products by methods to avoid product damage. Deliver all materials with Manufacturer's labels intact and legible.
 - B. Provide equipment and personnel to handle products by methods to prevent damage.
 - C. Timing of deliveries of materials to the site to be coordinated with the Owner.
- 1.08 Storage and Protection:
- A. Store any material susceptible to water damage in clean, dry, weather tight condition in a manner to protect against loss, damage, and wetting. On site storage of materials to be coordinated with the Owner's representative. Wet materials shall be marked, rejected for installation, and removed from the Site.
 - B. Materials subject to moisture intrusion and damage shall be stored on clean, dry, and raised platforms so as to prevent wetting or moisture absorption and yet provide sufficient ventilation to prevent condensation. These materials shall be covered so as to be completely weathertight. Factory-applied wrapping shall be unacceptable as the sole means of protection.
 - C. Any materials which when subject to moisture intrusion may have a detrimental effect on the installation of the roofing system, shall be stored as indicated Item 1.07B.
 - D. Materials that are damaged in any way or indicate moisture content above equilibrium shall be rejected as unacceptable.
 - E. Contractor shall employ all means possible to protect the remaining Owner's Facilities from water intrusion. All materials used in the protection of the facilities shall be approved roofing membrane materials. The use of Visqueen, duct tape, or other similar materials by the Contractor is not acceptable for temporary protection.
- 1.09 Product Options:
- Contractor Product Selection:
- A. Products specified only by referenced standard: Any product meeting that standard.
 - B. Products specified by naming several manufacturers: Products of any named manufacturer meeting specifications.
 - C. Products specified by naming one or more manufacturers and "or as approved"; Submit a request for substitution in accordance with Item 1.09 of this Section.
- 1.10 Substitutions:
- A. After award of the contract and prior to commencing work, the Architect/Engineer will consider requests from the Contractor for substitutions. Substitutions will then be considered only when a product becomes unavailable due to no fault of the Contractor.
 - B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
 - C. A substitution request constitutes a representation that the Contractor:
 - 1. Has investigated the proposed product and determined that it meets or exceeds, in all respects, specified product.
 - 2. Shall provide the same warranty for substitution as for specified product.
 - 3. Shall coordinate installation and make other changes which may be required for work to be complete in all respects.
 - 4. Waives claims for additional costs which may consequently become apparent.
 - D. Substitutions will not be considered when they are indicated or implied on Shop Drawings or Product Data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.
 - E. Samples of proposed substitutions shall be submitted with the request for substitution. Shop Drawings will not be considered for review on materials which have not been completely checked and stamped by the Contractor and, if substitutions, have not been previously submitted as called for in Section 013323.
 - F. The Architect/Engineer will determine acceptability of proposed substitution and will notify the Contractor of acceptance or rejection in writing within a reasonable time.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 016000 PRODUCT REQUIREMENTS (CONTINUED)

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 01 GENERAL REQUIREMENTS

SECTION 017000 EXECUTION AND CONTRACT CLOSEOUT

PART 1 - GENERAL

- 1.01 Closeout Procedures:
- A. A final inspection shall be conducted at the completion of the project at a time and date acceptable to the Architect, Owner, and Contractor. The final inspection shall be attended by the General Contractor, Owner's Representative, the Architect, Consulting Engineer, primary Sub-Contractors, and other designated persons.
 - B. The results of the inspection conducted by these parties, shall be recorded by the Architect. Items found to be incomplete or not in accordance with the contract documents shall be noted and a written punchlist forwarded to the Contractor for remedial action. The Owner shall also receive a copy of the punchlist.
 - C. Contractor shall remedy any and all deficiencies prior to final acceptance by the Architect.
- 1.03 Final Cleanup:
Remove waste and surplus materials, rubbish, and construction facilities from the site.
- 1.04 Closeout Documentation:
- A. Project Record Documents:
 - 1. At termination of work, the Contractor shall submit three sets of record drawings for approval by the Architect and submission to the Owner at the completion of the project.
 - 2. These drawings shall note the location of capped utilities, active utilities encountered during demolition in the area of work, or other such information which could be of use to the Owner or others in locating concealed utilities in the future.
 - 3. Submit "as built" documents with letter of transmittal indicating date, project number, Contractor's name and address, list of documents, and signature of Contractor. "As-built" documents must be submitted prior to Owner releasing final payment for project.
 - B. Guaranties/Warranties:
 - 1. Provide copies of all contractor's and manufacturer's guaranties and warranties requested properly executed in triplicate.
 - 2. Guaranties and warranties shall state name of project, location, name of Owner, name of Applicator, and date of substantial completion and final acceptance.
 - 3. Date of substantial completion and final acceptance will be as determined by the Architect for the entire project.
 - C. Contractor's Final Application and Certificate for Payment (AIA Document G702) or approved equivalent in triplicate, properly executed and notarized.
 - D. Contractor's Affidavit of Release of Liens (AIA Document G706A) in triplicate.
 - E. Contractor's Affidavit of Payment of Debts and Claims (AIA Document G706) in triplicate.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

End of Section

DIVISION 02. SITE WORK

SECTION 024100 DEMOLITION

PART 1 - GENERAL

- 1.01 Section Includes:
Work of this Section includes demolition and removal of all materials shown on Drawings and as specified herein within boundaries of work.
- A. Remove the following items from the work:
 - 1. Sections of concrete.
 - 2. Existing drywall ceiling as necessary to install the new ceiling access panel.
 - 3. Existing aluminum doors and frame.
 - 4. Remove and replace sections of the existing acoustical tile ceilings and grid as necessary to install new HVAC piping, electrical conduit, and wiring.
 - B. Miscellaneous items not listed above which must be removed for completion of the work.
 - C. Patch and repair all remaining materials suitable for installation of new finishes as noted on the drawings.
 - D. Removal of all debris from the site.
 - E. Obtain necessary permits and comply with all local ordinances for demolition work and disposal of construction debris.
 - F. Provide temporary partitions and dust barriers for noise, dust control and protection, existing construction to remain, and equipment.
 - G. Cap and identify exposed utilities, connect utilities to remain as shown on the drawings.
 - H. Security and safety measures, to include guardrails, barricades, roping, and safety tape around the area of work. Post warning signs as necessary to discourage unauthorized entry by the public in the areas of demolition.
 - I. Lead containing materials:
 - 1. Due to age of the facilities being demolished or renovated, the Contractor should expect to encounter building materials that contain lead or that are covered with lead containing coatings. The Contractor shall protect his workforce and worksite according to the provisions of 29 CFR 1926-the OSHA Construction Industry Standards during the course of the Work. The Owner considers the Contractor's adherence to workplace safety and health standards a reasonable precaution to prevent excessive exposure to lead hazards.
 - 2. These standards include (but are not limited to) provisions for worker exposure assessments, engineering controls, work practices, written programs, administrative programs, respiratory protection, protective clothing/equipment, hygiene facilities, medical surveillance programs and / or employee information/training.
 - 3. In addition, following any disturbance of potentially lead-containing substances, the Contractor(s) shall perform adequate cleaning to prevent lead exposure of Owners' employees, the general public and other trades.
 - 4. The Contractor shall be responsible for waste categorization of any lead coated material or debris and proper disposal of same in a disposal facility permitted to accept the material or debris.
- 1.02 Submittals:
- A. Submit a copy of all permits and certificates required for work of this Section.
 - B. Submit demolition procedures and operational sequence for review and acceptance by the Owner. These procedures shall include the following:
 - 1. Description of methods and equipment to be used.
 - 2. Schedule of coordination of utility services.
 - 3. Methods to be used for disposal of debris.
 - 4. Scheduled hours of work to be approved in advance by the Owner.
- 1.03 Protection:
- A. Safety measures and methods shall be used to protect personnel and property which is to remain undisturbed.
 - B. Schedule all work to cause minimum disturbance to facility operations. Advise the Owner 48 hours prior to beginning any work which could affect facility operations.
 - C. Do not interfere with use of the existing facility. Maintain free and safe passage to and from all areas normally trafficked by students, staff, and visitors.

DIVISION 02. SITE WORK

SECTION 024100 DEMOLITION (CONTINUED)

- D. Use approved methods to provide dust control during demolition.
 - E. Provide protection to adjacent construction and equipment not a part of this project from damage, and other areas where work is in progress.
 - F. Salvageable items noted for reuse shall be protected from damage, other items noted for salvage for the Owner, shall be turned over to him.
 - G. Contractor shall schedule and coordinate work to prevent damage to the existing building by un-authorized entry during unoccupied periods, and shall, where necessary, to control and prevent such damage or entry, install temporary closures for openings.
 - H. The Contractor is responsible for the protection of all public sidewalks that border the site. Any damage is to be repaired by removing damaged sections and replacement.
- 1.04 Existing Services:
- A. The Contractor shall disconnect and remove utility services only under the direction of the Owner. All temporary disconnection of the permanent services, prior to removal of the services in and to a structure to be demolished, shall be planned and authorized by the Architect/Engineer and the Owner.
 - B. Contractor shall give minimum 48 hours notice prior to the scheduled disconnection of any utility.
 - C. Place markers to indicate location of disconnected services. Indicate service lines and capping locations on Project records.
 - D. Provide new connections and tie-ins to the utilities in the building as shown on the drawings.
- 1.05 Job Conditions:
- A. Condition of Structures: The Owner assumes no responsibility for the actual condition of areas to be demolished.
 - 1. Bidders for this work shall make such investigations as they deem necessary to arrive at a contract price.
 - 2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner in so far as practicable.
- 1.06 Site Examination: The Contractor shall visit the site as necessary prior to beginning any work and examine all existing equipment and other conditions that might affect his work.

PART 2 - PRODUCTS

- 2.01 Salvaged Materials:
- A. Any structures or items noted to be salvaged will be designated as such and shall be removed in a manner that will prevent breakage or undue damage. Material or parts of structures which are to be salvaged, such as lumber, pipe, brick, concrete, etc., shall be removed in the manner directed by the Owner and stacked at the Site for future use.
 - B. Materials or parts of structures which, in the opinion of the Owner, are not salvageable, or which are designated as surplus by the Owner, shall be disposed of at locations off the job site as approved by the Owner.
- 2.02 Demolition Equipment: Equipment shall be selected for demolition operations which will not damage existing building components. Vibratory or percussion equipment shall be avoided whenever possible or whenever it will inflict damage to adjacent materials.

PART 3 - EXECUTION

- 3.01 Preparation:
- A. Maintain exit requirements.
 - B. Erect and maintain measures as required to prevent spread of dust, fumes and smoke to other parts of the building. On completion, remove partitions and repair damaged surfaces to match adjacent surfaces.
 - C. Carry out demolition work to cause as little inconvenience to adjacent occupied building areas as possible.
- 3.02 Temporary Shoring and Bracing:
- A. The Contractor shall be responsible for providing shoring and/or bracing for any building component from which support is removed during construction operations.

DIVISION 02. SITE WORK

SECTION 024100 DEMOLITION (CONTINUED)

- B. Shoring and bracing shall be designed to support the dead load of the shored element and any anticipated construction loads.
 - C. Shoring and bracing shall be installed at locations which will not overstress or damage existing structural members.
- 3.03 Demolition:
- A. All demolition shall be performed in accordance with applicable codes and regulations of authorities having jurisdiction.
 - B. Demolish in an orderly and careful manner as required to accommodate new work, including that required for connection to the existing building. Protect existing structural members, flooring to remain, and adjacent partitions.
 - C. Repair all demolition performed in excess of that required, at no cost to the Owner.
- 3.04 Removal:
- A. Remove from site contaminated or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
 - B. Remove demolished materials, debris, dust, tools and equipment from site upon completion of work. Leave site in a condition acceptable to the Architect and the Owner's Representative..
 - C. Transport all materials removed from demolished area and dispose of off-site. Off-site disposal shall be subject to agreement and provisions to be arranged and authorized by Architect, in accordance with local ordinances.
- 3.05 Repair:
- All damage done to existing structures that are to remain shall be repaired to the satisfaction of the Architect and the Owner's Representative. Any unsightly places shall be cleaned up and the site left in a neat and orderly condition.

End of Section

DIVISION 03. CONCRETE

SECTION 032000 CONCRETE REINFORCEMENT

PART 1 - GENERAL

- 1.01 Section Includes:
Reinforcement for cast-in-place concrete (including bars, welded wire fabric, ties, and supports) as shown on Drawings, and as specified herein.
- 1.02 Related Sections:
Cast-in-Place Concrete (SECTION 033000).
- 1.03 Quality Assurance:
- A. Reference Standards:
1. Standard References:
- A. Current edition of the following references shall apply to work of this Section. Suffixes indicating date of issue are omitted from reference numbers used in the text of this Section.
- B. Publications of the American Concrete Institute:
- | | | |
|----|---------|-----------------------------------------------------------------------------|
| 1. | ACI 117 | "Standard Tolerances for Concrete Construction and Materials" |
| 2. | ACI 301 | "Specification for Structural Concrete for Buildings." |
| 3. | ACI 315 | "Manual of Standard Practice for Detailing Reinforced Concrete Structures." |
| 4. | ACI 318 | "Building Code Requirements for Reinforced Concrete." |
- C. Publications of the CRSI:
"Manual of Standard Practice."
- B. Building Code: North Carolina Building Code-Latest revision with all current amendments.
- 1.04 Submittals:
- A. Shop Drawings:
1. Submit shop drawings in accordance with Section 013323.
 2. Shop drawings shall be in accordance with ACI 315.
 3. Show placing plans, bending details, and bar lists.
 4. Show details, bar clearances, notes, and necessary information for placing of reinforcing steel.
- 1.05 Delivery, Storage, Handling:
- A. Reinforcing steel shall be delivered to Project Site properly tagged, bundled, and ready to place.
- B. Reinforcing steel delivered to Project Site (and not immediately placed in forms), shall be protected from mud, excessive rust-producing conditions, oil, grease, or distortion. Reinforcing steel shall be stored off ground, on heavy timbers.
- C. Use all necessary precautions to maintain identification after bundles are broken.

PART 2 - PRODUCTS

- 2.01 Materials:
- A. Reinforcing Bars: New, deformed bars, conforming to ASTM A615(S1), or smooth bars at concrete joints, Grade 60; as required on Drawings.
- B. Welded Wire Fabric: Welded wire fabric shall be electrically-welded wire fabric of cold-drawn wire of gauge and mesh shown on Drawings, or as required. Fabric shall conform to ASTM A185, Grade 60 or Grade 70 and shall be furnished in rolls or prefabricated sheets for all slab-on-grade and concrete topping slabs.
- C. Steel Bar Mats: Shall conform to ASTM A184. Steel bars conforming to ASTM A615(S1), Grade 60.
- D. Tie wire shall be 16 gauge, or heavier, black annealed wire.
- E. Accessories:
Fabricate from concrete, metal, plastic or other approved materials.
- 2.02 Fabrication:
- A. Reinforcing steel shall be fabricated to shapes and dimensions indicated on Drawings,

DIVISION 03. CONCRETE

SECTION 032000 CONCRETE REINFORCEMENT (CONTINUED)

- and in compliance with applicable provisions of ACI 315 and ACI 318.
- B. Bars shall be bent cold in shop. No bars shall be bent in field, unless specifically indicated on Drawings.
 - C. Fabrication of reinforcing steel prior to review and approval of shop drawings by Architect shall be solely the responsibility of the Contractor.

PART 3 - EXECUTION

- 3.01 General Requirements for Reinforcing:
 - A. Reinforcing shall be free from scale, loose rust, mud, or coatings which will reduce bond to concrete.
 - B. Bars with kinks or bends not shown on Drawings shall not be placed. Heating of reinforcing for bending or straightening will not be permitted.
 - C. Minimum concrete cover for reinforcing shall be as shown on Drawings.
- 3.02 Placing of Reinforcement:
 - A. Tolerances: Bars shall be placed to the following tolerances:
 - 1. Concrete cover to formed surfaces: + one-quarter inch.
 - 2. Top bars in concrete slab: \pm one-quarter inch.
 - 3. Clearance to vertical form surface: \pm one-quarter inch.
 - B. Spacing of Bars:
Minimum clear distance between parallel bars shall be equal to nominal diameter of bar. In no case shall clear distance between bars be less than 1", nor less than one and one-third times maximum size of coarse aggregate.
 - C. Accessories:
 - 1. In footings in earth, support reinforcing with precast concrete blocks. Tie reinforcing securely to prevent displacement. Blocks shall be thoroughly wetted prior to placing concrete.
 - 2. Nails shall not be driven into form work to support reinforcement.
 - 3. Space bar supports in accordance with ACI 315, ACI 301 and CRSI Manual of Standard Practice.
 - D. Securing Reinforcement:
 - 1. Reinforcing bars shall be supported and wired together to prevent displacement by construction loads, or by placing of concrete, beyond tolerances as set forth herein before.
 - 2. Any and all disturbances of reinforcement from any cause whatsoever shall be corrected fully prior to placing of concrete. Damaged bar-supports and spacers shall be repaired, or shall be removed and replaced.
 - 3. Bars shall not be bent after being embedded in hardened concrete, unless indicated so on Drawings.
 - 4. When required or approved, welding of reinforcing steel shall conform to AWS D1.4. Do not weld at bend in a bar. Welding of cross bars shall not be permitted unless authorized by Architect.
- 3.03 Field Quality Control:
Review of Placement of Reinforcing Steel:
 - A. Architect shall be given advanced notice of not less than 24 hours prior to placing concrete to allow review of reinforcing steel.
 - B. Architect shall be given notice required hereinbefore, and shall be given opportunity to review (for correction) placement of reinforcing steel before placing of concrete. Any concrete placed without approval of the Architect or the Owner's Representative will be subject to rejection.
 - C. Inspection of placement of reinforcement in a section will be made only after placement is complete for that section to be poured.
 - D. Such inspections shall not relieve Contractor of his responsibility to provide work in accordance with requirements of Contract Documents. Such inspections are for purpose of minimizing errors in field work.

End of Section

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

- 1.01 Section Includes:
- A. Cast-in-place concrete as shown on drawings, and as specified herein.
 - B. In general, this work includes providing cast-in-place concrete consisting of Portland Cement, fine and coarse aggregate, selected admixtures, mixing, transporting, and placing, as specified herein.
 - C. This Section further includes testing, related items of quality control, and evaluation of concrete strength.
- 1.02 Related Sections:
Concrete Reinforcement (SECTION 032000).
- 1.03 Quality Assurance:
- A. References:
Some products and execution are specified in this Section by reference to published specifications or standards of the following (with respective abbreviations used).
 - 1. American Concrete Institute (ACI)
 - 2. American Society for Testing and Materials (ASTM)
 - B. Standard References:
Current edition of the following standard references shall apply to the work of this Section as indicated. Suffixes indicating issue date are omitted from reference numerals elsewhere in text. Concrete work shall comply with the following standards and codes except as indicated otherwise on Drawings or herein.
 - 1. ACI 301 "Specifications for Structural Concrete"
 - 2. ACI 302 "Guide for Concrete Floor and Slab Construction"
 - 3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete"
 - 4. ACI 305 "Hot Weather Concreting"
 - 5. ACI 306 "Cold Weather Concreting"
 - 6. ACI 309 "Recommended Practice for Consolidation of Concrete"
 - 7. ACI 311 "Recommended Practice for Concrete Inspection"
 - 8. ACI 318 "Building Code Requirements for Reinforced Concrete"
 - C. Building Code: North Carolina Building Code - Latest edition with all current amendments.
 - D. Ready-mixed concrete production facilities shall be certified by the National Ready-Mixed Concrete Association, or the Producer shall demonstrate, to the satisfaction of the Architect, ability to comply with this Section.
 - E. Testing:
 - 1. Perform tests on new concrete as required in this specification.
 - 2. Testing to be performed by an independent testing laboratory selected by the Contractor and approved by the Owner.
 - 3. Cost for all testing to be included in the Contractor's bid.
- 1.04 Submittals:
- A. Submittals shall be in accordance with Section 013323.
 - B. Submit copies of the proposed design mix for each class of concrete specified herein.
 - C. Submit four copies of records of concrete placements showing exact location of placement, date of placement, quantity of placement, and class of concrete placed. Submit to Architect each week.
 - D. Submit Manufacturer's printed technical and performance data on admixtures proposed for use on Project.

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- E. Submit certificates required herein.

PART 2 - PRODUCTS

2.01 Acceptable Manufacturers:

- A. Concrete Admixtures:
1. Euclid Chemical Co., Cleveland OH
 2. Master Builders Co., Cleveland OH
 3. Sika Corporation, Lyndhurst NJ

2.02 Materials:

- A. Portland Cement: Shall conform to ASTM C150, Type I. Only one brand of cement shall be used except when authorized in writing by Architect.
- B. Fly Ash: Fly ash shall have a high fineness and low carbon content and shall meet the requirements of ASTM C618, "Specification for Fly Ash and Raw or Calcined Natural for use in Portland Cement Concretes for Class F, except that the loss of ignition shall be less than 3% and all fly ash shall be a classified processed material. Fly ash shall be obtained from one source for the concrete delivered to the project. Complete chemical and physical analysis of each carload of fly ash shall be submitted to the Architect (10) days prior to use for each carload delivered. Concrete mixes proportioned with fly ash shall have no more than 20% cement (by weight) replaced by fly ash.
- C. Fine Aggregate: Shall be clean, sharp, natural sand; free from loam, clay, lumps, or other deleterious substances.
- D. Course Aggregates for Concrete:
1. For Normal Weight Concrete: Shall conform to ASTM C33.
Coarse Aggregate: Shall be clean, uncoated aggregate containing no clay, mud, loam or foreign matter; and processed from natural rock or stone.
 2. For Semi-lightweight Concrete: Shall conform to ASTM C330, sand/lightweight aggregate.
Shall be clean, uncoated aggregate containing no clay, mud, loam or foreign matter.
 3. Aggregate size shall not be larger than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourths of minimum clear spacing between individual reinforcing bars.
- E. Water: Shall be clean, fresh, free from oil, organic matter or other deleterious substances.
- F. Concrete Admixtures:
1. Shall be produced by acceptable manufacturers. Do not use admixtures which have not been incorporated and tested in mixes accepted for use on Project, unless authorized otherwise in writing by Architect. Admixtures shall be "Chloride Free" and shall not contain more chloride ions than are present in municipal drinking water.
 2. Air-entraining Admixtures: Shall conform to ASTM C260, Vensol Resin Type.
 3. Water-reducing Set-controlling Admixtures: Shall conform to ASTM C494, Type A (water-reducing). Shall be Eucon WR-75, Pozzolith 200N or Plastocrete 160.
 4. High Range Water-reducing Admixtures (Super-plasticizer): Shall conform to ASTM C494, Type F. Shall exceed ASTM C666 for freeze/thaw durability. Manufacturers shall be Euclid or Sika.
 5. Retarders: Shall conform to ASTM C494, Type D. Shall be Eucon Retarder-75,

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- Pozzolith 100XR, or Plastiment.
6. Non Corrosive Accelerators: Shall conform to ASTM C494, Type C or E. Shall be non-chloride, non-corrosive, and contain no more chloride ions than are present in municipal drinking water.
- A. Admixture manufacturer must have long-term non-corrosive test data from an Independent Testing Laboratory of at least a year's duration using an acceptable accelerated corrosion test method such as using electrical potential measures.
7. Provide certification of compliance of admixtures with applicable ASTM standards, in writing to Architect when submitting design mixes. Provide certification of chloride ion content.
- G. Forms:
1. Plywood, exterior grade, DFPA, Class II, B-B.
 2. 5/8 Inch, 5 ply minimum.
 3. Steel forming for walkways and curb and guttering.
- H. Form Oil:
Non-staining mineral oil.
- I. Saw Joint Filler:
1. Semi-rigid, self-leveling epoxy. Material shall have the following properties:

<u>Property</u>	<u>Value</u>
Solids content (by wt)	100%
Hardness (Shore D)	50 min
Tensile strength	400-500 psi
Adhesion to concrete	180-230 psi
 2. "Sikadur 51SL" as mfd. by Sika Corporation, Lyndhurst NJ.
- J. Joint Sealer for Isolation Joints:
Joint sealer shall be an epoxy base or polyurethane base with a minimum shore A hardness of 35. The joints shall not be sealed sooner than 30 days after the slab placement.
- K. Bonding Compounds:
1. An aqueous resin emulsion formulated in a polyvinyl base; rewettable. (For use in areas not subject to moisture only).
 2. One of the following:
"EucoWeld" as mfd. by Euclid Chemical Co.
"Weldcrete" as mfd. by the Larsen Co.
- L. Epoxy Adhesive:
1. Two component, 100% solids, 100% reactive compound conforming to ASTM C881. For use on damp or dry surfaces.
 2. One of the following:
"Euco Epoxy No. 452MV or No. 620" as mfd. by Euclid Chemical Co.
"Sikadur Hi-Mod" as mfd. by Sika Chemical Co.
- M. Fiber Reinforcement (for concrete paving, dumpster pads):
1. Fiber reinforcement shall be added to concrete either at the batch plant or job site at a rate of 1.5 pounds per cubic yard.
 2. If added at job site, allow 3 to 5 minutes mixing time at agitating speed.
 3. Fiber shall be added and distributed prior to incorporation of superplasticizer (if used).
 4. Fiber shall be a minimum of 2-1/4" long unless otherwise noted on Drawings.

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

2.03 Mix Designs:

- A. Prepare design mixes for each class of concrete used in accordance with ACI 318 . Prepare mixes by either laboratory trial batches or field experience. Do not begin concrete production until mixes have been reviewed by Architect.
 - 1. Design mix cost shall be paid by the Contractor.
 - 2. Submit written reports to Architect of each proposed mix for each class of concrete prior to start of work.
 - 3. Design mixes shall include a cover letter prepared by a Registered Engineer of an approved independent Testing Laboratory (on company letterhead of laboratory) certifying compliance of design mix with appropriate ACI procedure and list all materials and proportions required for design mix (including specific gravity, fineness modulus and unit weight).
 - 4. Design mixes utilizing fly ash shall use 50% by weight of fly ash to determine water/cement ratios.
- B. Laboratory Trial Batches:
 - 1. Laboratory trial batches shall be prepared, batched and tested by an approved independent Testing Laboratory.
 - 2. When laboratory trial batches are used to select concrete proportions, prepare specimens in accordance with Section 4.4 of ACI 318. Prepare test specimens in accordance with ASTM C192, and conduct strength tests in accordance with ASTM C39.
 - 3. Establish a curve showing relationship between water/cement ratio or cement content and compressive strength, with at least 3 points representing batches which produce strengths above and below that required. Use not less than three specimens tested at 28 days, to establish each point on the curve.
 - 4. The proposed design mix shall achieve a compressive strength of 1200 psi greater than the specified strength. This overdesign shall be increased to 1400 psi for concrete strengths greater than 5000 psi.
- C. Field Experience Method:
 - 1. When field experience methods are used to select concrete proportions, establish proportions as specified in ACI 318, Section 4.3.
 - 2. Strength data for establishing standard deviation will be considered suitable if concrete production facility has certified records consisting of at least 30 consecutive tests in one group or the statistical average for 2 groups totaling 30 or more tests, representing similar materials and project conditions. Data shall be less than 12 months old.
- D. Standard Deviation:
Standard deviation of design mix shall be in accordance with ACI 318, Section 4.3.1.
- E. Concrete for all design mixes shall be proportioned to result in maximum slumps specified in Section 2.05 for concrete without super-plasticizer unless otherwise permitted by Architect (in writing).
- F. Design mixes shall be proportioned and tested using maximum specified slump, air entrainment, and a minimum concrete temperature of 80 degree F.
- G. Prepare design mixes with required admixtures (except superplasticizer). If more than one admixture is used in a mix, certify compatibility of admixtures.
- H. Contractor shall be responsible for providing concrete mixes of acceptable workability to provide required appearance, durability, and watertightness.
- I. Consistency and Composition: The concrete shall be of such consistency that it can be

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

worked readily into the corners and angles of the forms and around reinforcement without permitting materials to segregate, or free water to collect on the surfaces. Within the limiting requirements, adjust the consistency of the concrete as may be necessary to produce mixtures which will be placeable with reasonable methods of placing and compacting.

- J. Concrete subject to freezing and thawing shall have a maximum water/cement ratio of .50 by weight. Concrete subject to deicers and/or required to be watertight shall have a maximum water-cement ratio of 0.45.
 - K. Concrete mixes shall be designed with minimum pounds of cement/cu. yd. as follows: 450 lbs. for 3000 psi and 530 lbs. for 4000 psi.
 - L. The use of fly ash in air-entrained concrete is prohibited.
 - M. All interior slabs shall have a maximum air content of 3%.
- 2.04 Use of Admixtures:
- A. Admixtures shall be used in strict accordance with Manufacturer's printed instructions. Design mix shall be proportioned using the proposed admixtures. Use admixtures only with written approval of Architect unless specified herein.
 - B. Air-entraining admixtures shall be used for all concrete exposed to freezing and thawing, or subjected to hydraulic pressure. The following proportions of air shall be used: 4.5% to 7.5% for normal weight concrete.
 - C. Use water-reducing admixtures in strict compliance with Manufacturer's printed directions.
 - D. Use amounts of admixtures as recommended by Manufacturer for climatic conditions prevailing at time of placing. Adjust quantities of admixtures as required to maintain quality control.
 - E. Calcium chloride, in any form, or admixtures containing more than 0.05% chloride ions shall not be used in any concrete. Admixtures containing thiocyanate will not be permitted.
- 2.05 Concrete Mixing:
- A. All concrete shall be ready-mix concrete, shall comply with requirements of ASTM C94, and shall be as specified herein unless otherwise noted. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 will be required as follows:
 - 1. When air temperatures are between 80 degree F. and 90 degree F., reduce mixing and delivery time from one and one-half hours to one hour.
 - 2. When air temperatures are above 90 degree F., reduce mixing and delivery time from one and one-half (1-1/2) hours to forty-five (45) minutes.
 - 3. Redosage of concrete with high-range water-reducing admixture may be used with prior approval of Architect as to methods and procedures.
 - B. Compressive Strengths:
Concrete shall have the following 28 day compressive strengths:
Floor slabs, foundations, walkways, ramps, and equipment pads.....3,000 psi
 - C. Unit Weights:
 - 1. Normal Weight Concrete: Shall have an air dry unit weight not in excess of 150 p.c.f.
 - 2. Structural Lightweight Concrete: Shall have an air dry unit weight not in excess of 120 p.c.f.
 - D. Slumps:
 - 1. Concrete shall be proportioned to give the following slumps at point of placement:
 - A. Concrete with high range water-reducing admixture:

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

1. Before addition of Plasticizer.....min. 2", max. 3"
2. After addition of Plasticizer.....min. 5", max. 7"
max. 4" for slab-on-grade
- B. All other concrete.....min. 2", max. 4"
max. 3" for slab-on-grade
2. All Concrete mixes for use in concrete walls, piers, columns, slabs on grade, and supported slabs shall be prepared using a high-range water-reducing admixture in addition to any other required admixture. All pumped concrete and concrete containing fiber reinforcement shall contain super-plasticizer.
- E. Workability:
 1. Concrete without super-plasticizer:
 - A. The addition of water at the job site will be permitted as specified herein only.
 - B. Concrete delivered to Site with a slump greater than maximum slump specified shall be rejected and disposed of off Owner's property.
 - C. Water shall not be added to concrete such that design water/cement ratio is exceeded.
 - D. Concrete producer shall furnish delivery tickets for each load stating the maximum amount of water that may be added without exceeding the required water/cement ratio.
 - E. Addition of water at Site for concrete mix with insufficient slump and for slump less than maximum specified herein, will be allowed only by a qualified Concrete Technician. Addition of water to concrete mix by any other person or persons other than the qualified Concrete Technician will not be permitted.
 2. Concrete with super-plasticizer:

The addition of admixture for concrete mix with insufficient slump and for slump less than maximum specified herein, will be allowed only by a qualified Concrete Technician. Addition of plasticizer to concrete mix by any other person or persons other than the qualified Concrete Technician will not be permitted.

Concrete delivered to Site with a slump greater than maximum slump specified shall be rejected and disposed of off Owner's property.
- F. Maintain equipment in proper operating condition, with drums cleaned before changing of each batch. Schedule delivery of trucks in order to prevent delay of placing after mixing.
- G. Concrete Producer shall furnish delivery tickets with each load. Tickets shall conform to requirements of ASTM C94, and shall certify contents of load.

PART 3 - EXECUTION

- 3.01 Pre-placement Inspection:
 - A. Before placing concrete, the formwork installation, reinforcing steel, and items to be embedded or cast-in shall be complete. Notify other crafts involved in ample time to permit installation of their work; cooperate with other trades in setting such work, as required.
 - B. Notify Architect upon completion of installation of all reinforcing and other items in ample time to permit inspection of the work.
 - C. Remove all foreign matter from area to receive new concrete.
 - D. Install underslab fill in accordance with Section 312000.

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- E. Soil at bottom of foundations is subject to inspection by an Independent Testing Laboratory.
- 3.02 Testing:
- A. The Contractor shall retain an independent testing laboratory approved by the Owner to perform tests as outlined below, to verify compliance with these specifications, and to submit the results of the tests to the Architect/Engineer and the Owner. Costs of all testing shall be paid by the Contractor.
 - B. All concrete testing shall be performed by a laboratory meeting the requirements of ASTM E-329, STANDARD RECOMMENDED PRACTICE FOR TESTING AGENCIES FOR CONCRETE USED IN CONSTRUCTION. Accreditation as a Class (1 or II) laboratory by BACTL (Board of Accreditation of Concrete Testing Laboratories, Inc.) Will suffice as evidence of the laboratory meeting these ASTM requirements.
 - C. Procedure shall be in accordance with the testing chapter of ACI-301.
 - D. Sampling fresh concrete: ASTM C172.
 - E. Slump:
 - 1. Make slump test during each pouring in accordance with ASTM C-143.
 - 2. Slump requirements:

Foundations, walls, footings, grade beams	2" - 4".
Slabs, beams, piers, walkways, columns	2" - 3".
 - F. Compressive strength specimens and tests:
 - 1. Two specimens shall be obtained for testing at 28 days for acceptance and two shall be obtained for testing at 7 days for informational purposes.
 - 2. Evaluation of tests shall be in accordance with ACI-318, Section 4.8, except that one sample of four cylinders shall be taken for each 100 cubic yards, or fraction thereof, of each class of concrete placed each day.
- 3.03 Concrete Placement:
- A. Place concrete in compliance with practices and recommendations of ACI 304, or as specified herein.

The addition of super-plasticizer to concrete mixes shall be monitored or performed by a qualified representative of the Testing Laboratory retained by Owner.
 - B. Concrete shall be handled from mixer to place of final deposit as rapidly as practical, by methods which will prevent separation or loss of ingredients, and in a manner which will assure that required quality concrete is obtained.
 - C. Conveying equipment shall be of size and design to insure a continuous flow of concrete at delivery end.
 - D. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited in concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, construction joints shall be located at points as provided for in Drawings or as approved by Architect. Placing shall be carried on at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as possible to its final location to avoid segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.
 - E. A vibrating screed shall be used for slab-on-grade and supported slabs. Screed concrete which is to receive other construction to proper level to avoid excessive skimming or grouting. Check elevation of forms before and after screeding operation, on both sides of slab.
 - F. Do not use concrete which has become non-plastic and unworkable, which does not meet

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- required quality control limits, or which has become contaminated by foreign material. Remove rejected concrete from Owner's property, and dispose of in an acceptable location.
- G. Soil at bottom of foundation systems is subject to testing and inspection for soil bearing value by an Independent Testing Laboratory as selected and paid for by the Owner, and as directed by Architect. Place concrete or seal with mud mat immediately after approval of foundation excavations.
- H. Remove temporary spreaders in forms when concrete placing has reached elevation of such spreaders.
- I. Concrete shall be worked around reinforcement and embedded fixtures, along surfaces and into corners of form. Vibrators may be used provided they are operated under experienced supervision.
- J. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand-spading, rodding, and tamping. Vibration of forms and reinforcing steel will not be permitted.
- K. Do not use vibrators to transport concrete inside forms. Insert and withdraw vertically at uniformly spaced locations not further than visible effectiveness of vibrator. Do not insert vibrators into lower levels of concrete that has begun to set. Use and type of vibrators shall be in accordance with ACI 309.
- L. Do not permit concrete to fall free in excess of 4'-0" except as approved. Place concrete in piers and walls with a tremie.
- M. Deposit and consolidate concrete in slabs in continuous operation, within limits of construction joints, until placing of entire section is complete.
- N. Do not use rakes with tines to level or transport concrete.
- O. Bring surface of slabs to correct elevations with straight-edge and strike off. Use bull-floats, highway straight edge, or darbies to smooth surface, leaving it free of humps and hollows. Do not sprinkle water on plastic surface. Do not disturb surface prior to beginning finishing operation.
- P. Vibration along edges of forms will be required to prevent honeycomb along edge of slab.
- 3.04 Construction Joints:
- A. Joints not shown on Drawings shall be made at locations that will least impair strength of structure, and shall be approved by Architect prior to construction.
- B. Roughen surfaces of set concrete at all joints. Clean surfaces of laitance, coatings, loose particles, and foreign matter. Roughen surfaces in a manner to expose bonded aggregate uniformly and to leave no laitance, loose particles of aggregate, or damaged concrete at surface.
- C. Prepare for bonding of fresh concrete to new concrete that has set (but is not fully cured) as follows:
1. Dampen at joints between foundation systems and walls or columns, but do not saturate. Dampen roughened and cleaned surface of set concrete immediately before placing fresh concrete.
 2. At vertical joints in exposed work, saturate roughened and cleaned surface of set concrete; and apply bonding compound as per Manufacturer's printed instructions.
- D. Conform to slab placement diagrams or pattern layout for placement as shown on Drawings.
- E. Provide keyways at least 1-1/2" deep in all construction joints in walls, supported slabs, and between walls and foundation systems.

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- F. Provide isolation joints in slabs-on-grade at all points of contact between slabs on ground and vertical surfaces, (such as column pedestals, foundation walls, and masonry walls) and elsewhere as indicated.
 - G. Provide sawn control-joints in slabs-on-grade as shown on Drawings. Use cuts 1/8" wide by 1/4 of slab deep, unless shown otherwise. Control joints shall be cut within 12 hours after concrete is finished, except when mean daily temperature is below 50 degree F, cut within 24 hours. Seal joint with dissipating resin curing compounded sprayed into joint immediately after cutting.
 - H. Fill control and isolation joints with approved joint filler. Fill no sooner than 120 days following placing of concrete.
- 3.05 Cold Weather Placing:
- A. Protect all concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with requirements of ACI 306, and as specified herein.
 - B. When air temperature has fallen to or is expected to fall below 40 degree F., provide adequate means to maintain temperature in area where concrete is being placed at either 70 degree F. for 3 days or 50 degree F. for 5 days after placing. Provide temporary housing or coverings including insulating blankets or polystyrene covered with polyethylene. Keep protection in place and intact at least 24 hours after artificial heat is discontinued. Avoid rapid dry-out of concrete due to overheating, and avoid thermal shock due to sudden cooling or heating. For slab-on-grade, protection shall remain in place a minimum of 5 days.
 - C. When air temperature has fallen to or is expected to fall below 40 degree F., uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degree F. and not more than 60 degree F. at point of placement.
 - D. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen material. Ascertain that forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow, and ice before placing concrete.
 - E. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators. Use only specified non-corrosive, non-chloride accelerators.
 - F. Do not place concrete when freezing weather is predicted within 24 hours.
- 3.06 Hot Weather Placing:
- A. Cool reinforcing by wetting sufficiently so that steel temperature will not exceed ambient air temperature immediately before placing concrete.
 - B. Wet forms thoroughly before placing concrete.
 - C. If ambient air and/or subgrade temperature is above 80 degree F. retarders may be used if approved by Architect.
 - D. If ambient air temperature is above 80 degree F., interior slab-on-grade shall not be placed unless roof deck above slab is in place. Provide wind screens when required.
 - E. Concrete with a temperature of 90 degree F. or above shall not be used.
- 3.07 Miscellaneous Concrete Items:
- Provide machine and equipment bases and foundations, as shown on Drawings. Set anchor bolts for machines and equipment with template at correct elevations, complying with certified diagrams or templates of Manufacturer furnishing machines and equipment.
- 3.08 Removal of forms:
- A. Remove forms in accordance with good practice, without damage to concrete to insure

DIVISION 03. CONCRETE

SECTION 033000 CAST-IN-PLACE CONCRETE (CONTINUED)

- complete safety of structure.
 - B. Leave shoring in place until concrete member will safely support its own weight and the loads upon it.
 - C. Consult the Architect/Engineer in case of uncertain conditions.
 - D. Shoring and forms supporting the concrete structure of all floors and roofs shall be kept in place until the concrete has reached a minimum cylinder strength of 3,000 psi (cylinders cured under field conditions).
 - E. Upon removal of forms the Architect will designate which surfaces may be pointed up and how slightly damaged portions of concrete will be patched or replaced.
- 3.09 Finishing:
- A. Remove all exposed tie wires and stapled ends from surfaces to be exposed, rub smooth or cut off fins and rough places, remove all loose concrete, fill honey-combs and other irregularities with cement mortar.
 - B. Do not patch any surfaces until examination has been made and permission given.
 - C. Finishes:
 - 1. Interior concrete slabs: steel trowel finish.
 - 2. Exterior concrete, walkways, equipment pads, ramps, curbs & gutters: Fine hair broom finish.
 - 3. Dusting to absorb surface water will not be permitted.
- 3.10 Curing and Protection:
- A. Protect against frost and rapid drying, keep continuously moist at least five days after placement, if necessary protect with suitable temporary cover, or apply curing compound (do not apply curing compound on concrete to receive plaster or ceramic / quarry tile finish).
 - B. Slabs:
Apply curing compound for areas to receive vinyl composition tile or carpet, or interior slabs to be left unfinished. Float finish areas to receive ceramic or quarry tile, damp cure.
 - C. Damage:
 - 1. Use all means necessary to protect cast-in-place concrete materials before, during, and after installation and to protect the installed work and materials of all other trades.
 - 2. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.
- 3.11 Workmanship:
Concrete work which does not conform to specified requirement (including strength, tolerances, and finishes), shall be corrected and/or replaced as directed by Architect, at Contractor's expense, without extension of time therefore. Contractor shall also be responsible for cost of corrections to any work affected by or resulting from correction to concrete work.

End of Section

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING

PART 1 - GENERAL:

- 1.01 Section Includes:
 - A. Standard light weight steel studs.
 - B. Cold-formed steel horizontal framing and bridging.
 - C. Metal furring strips.
 - D. Cold-formed steel framing accessories.
- 1.02 Related Sections:
 - Gypsum dry wall (Section 09250).
- 1.03 Quality Assurance:
 - Designed in accordance with:
 - A. AISC "Specification for the Design of Cold-Formed Steel Structural Members", latest edition.
 - B. ASTM Specification C-955.
 - C. ASTM A 370 - Standard Test Methods and Definitions for Mechanical Testing of Steel Products.
 - D. ASTM A 570/A 570M - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
 - E. ASTM A 611 - Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Structural Quality.
 - F. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated by the Hot-Dip Process.
 - G. AWS D1.3 - Structural Welding Code - Sheet Steel.
- 1.04 Design Requirements:
 - Design system components in accordance with AISI reference; provide for movement of components due to thermal variations without damage, failure, or excessive stress on components.
 - A. Conform to requirements of the North Carolina State Building Code, Volume 1.
 - B. Interior steel stud assemblies:
 - 1. Withstand 5 pounds per square foot live load, plus weight of assembly.
 - 2. Maximum Allowable Deflection: L/360 of span under total design loads.
 - C. Horizontal Assemblies (Ceiling framing over Mechanical 122):
 - 1. Withstand 20 pounds per square foot live load, plus weight of assembly.
 - 2. Maximum Allowable Deflection: 1/360th of span under total design loads.
- 1.05 Submittals:
 - A. Submit under provisions of Section 013323.
 - B. Product Data: Manufacturer's descriptive literature for products specified this section.
 - 1. Shop Drawings:
 - A. Indicate locations of cold-formed framing assemblies in project.
 - B. Indicate sizes and spacings of framing components.
 - C. Indicate fastening methods between framing members and to adjacent products/materials
 - D. Indicate bearings, anchors, and other products/materials required for construction activities of this section; indicate products/materials not supplied by manufacturer of products of this section.
 - 2. Quality Assurance Submittals:
 - A. Manufacturer's Instructions: Printed installation instructions for products specified in this section.
 - B. Mill Certificates for each type structural framing member, indicating the

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING (CONTINUED)

following information:

1. Bare metal thickness of steel, measured to 1/1000 inch.
2. Yield strength of steel.
3. Tensile strength of steel.
4. Total elongation of steel in 2 inch gage length.
5. Chemical analysis of steel.
6. Thickness of galvanized coating, measured to 1/1000 inch.

PART 2 - PRODUCTS:

2.01 Manufacturers:

- A. By one of the following:
 1. Unimast Incorporated.
 2. Dale/Incor.
 3. Marino Industries Corporation.
 4. Approved equal.
- B. Supply all products specified in this section from a single manufacturer.

2.02 Components:

- A. Studs: Conforming to ASTM C 955 and as follows:
 1. Material: Mill-certified steel conforming to ASTM A 653, G60 galvanized coating, and as follows:
 - A. 18 gauge and lighter: Minimum yield strength 33,000 pounds per square inch.
 - B. 16 gauge and heavier: Minimum yield strength 50,000 pounds per square inch.
 2. Shape: Cold-formed C-channel section.
 3. Thickness: Required for specified design requirements and as indicated on drawings.
 4. Sizes: Required for specified design requirements, and as indicated on drawings.
- B. Track:
 1. Material: Steel, matching material, gage, and finish of studs.
 2. Shape: Cold-formed channel section.
 3. Size: Web depth matching studs.
- C. Bridging:
 1. Material: Steel, matching material and finish of studs, 16 gauge.
 2. Shape: Cold-formed channel section.
 3. Size: 1-1/2 inches web depth.
- D. Miscellaneous Framing Components:
 1. Provide required or indicated items matching material and finish of major steel components.
 2. Slip track, foundation clips, end clips, framing clips, bracing, and all applicable accessories to make a complete installation, sizes to accommodate width of studs.
- E. Interior furring channels:
 1. 7/8" galvanized corrosion resistant coated steel, DWC, "hat" type furring channels.
 2. 20 gauge.
- F. Anchors and Fasteners: Provide required or indicated items; provide galvanized fasteners for assemblies having galvanized major steel components.

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING (CONTINUED)

- G. Primer: Zinc-rich primer for galvanized surfaces conforming to FS TT-P-645.

PART 3 - EXECUTION:

- 3.01 Examination and verification of conditions:
- A. Bearings and substrates are ready for construction activities of this section.
 - B. Rough-in utilities are in correct locations.
- 3.02 Installer's Examination:
- A. Have installer of this section examine conditions under which construction activities of this section are to be performed, provide notification if such conditions are unacceptable.
 - B. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
 - C. Beginning construction activities of this section indicates installer's acceptance of conditions.
- 3.03 Installation:
- A. Field Welding: In accordance with AWS D1.3, and the following:
 - 1. Stud-to-track connections: 1/2 inch fillet weld, full length of inside flange dimension, inside each flange of stud onto track web.
 - 2. All other connections: Flat, plug, butt, or seam.
 - 3. Minimum steel thickness for welded connections: 18 gauge.
 - 4. Welds shall conform to the requirements of AWS D1.1, AWS D1.3, and AISI Manual Section E2.
 - 5. Touch up all steel bared by welding using zinc-rich paint.
 - B. Field Fastening:
 - 1. Use minimum 2 self-tapping metal screws per connection, unless otherwise indicated.
 - 2. Steel drill screws shall have a protective coating at least equivalent to cadmium or zinc plating (ASTM A-165 Type NS).
 - C. Installation to be in complete accord with approved manufacturer's recommended installation instructions.
 - D. Framing heights as noted on drawings.
 - E. Wire tying of components shall not be permitted.
 - F. Splices in framing components, other than runner track, shall not be permitted.
 - G. Provide reinforcement where holes are field cut through load bearing members in accordance with manufacturer's recommendations.
 - H. Temporary bracing, where required shall be provided until erection is complete.
 - I. Framing:
 - 1. Align top and bottom tracks to insure plumb installation.
 - 2. Install caulk between floor track and floor, studs and walls of different construction.
 - 3. Secure tracks at a maximum of 24" O.C.
 - 4. Studs to be secured to continuous runner tracks unless the stud end terminates at deflection track for non-load bearing conditions.
 - 5. Seat studs in both upper and lower tracks square with track flange, with stud end maximum 1/16 inch from surface of track web.
 - 6. Plumb and align all studs vertically, securely attach load bearing studs to flanges or webs of upper and lower tracks.
 - 7. Where splicing of track is necessary between stud spacings, a piece of stud shall be placed in the track fastened with two screws or welds per flange to each piece

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING (CONTINUED)

- of track.
- 8. Install studs 16 inches on center, unless otherwise noted on drawings, maximum 2 inches from abutting walls; construct corners using minimum three studs.
- 9. Install double studs at jambs of openings for doors, cased openings, and windows; install intermediate studs above and below openings to align with wall stud spacing.
- 10. Attach cross studs for attachment of fixtures; install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- 11. Provide minimum one row of bridging at mid-height of wall, bridging rows spaced not to exceed 5'-0" on center.
- J. "Hat" type furring channels:
 - 1. Install at 16" o.c. maximum.
 - 2. Secure with approved corrosion resistant fasteners through channel flanges to substrate.
 - 3. Install plumb and level.
- 3.04 Site Tolerances:
 - A. Variation from Plumb: Maximum 1/8 inch in 10 feet.
 - B. Variation from Level: Maximum 1/8 inch in 10 feet.
 - C. Variation from True Plane: Maximum 1/8 inch in 10 feet.
 - D. Variation from True Position: Maximum 1/4 inch.
 - E. Variation of Member from Plane: Maximum 1/8 inch.

End of Section

DIVISION 05. METALS

SECTION 055000 METAL FABRICATIONS

PART 1 - GENERAL:

- 1.01 Section includes:
- A. Steel pipe bollards.
 - B. All other iron and steel not specifically described in other sections of these specifications but required for a complete and operable facility.
 - C. Shop paint.
 - D. Shop drawings.
- 1.02 Related sections:
- A. Concrete Reinforcement (Section 032000).
 - B. Masonry Reinforcement (Section 041500).
- 1.03 Quality Assurance.
- A. Field Measurements:
Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming/fitting where taking field measurements before fabrication might delay work.
 - B. Shop Assembly:
Preassemble in shop to greatest extent possible to minimize field splicing/assembly; disassemble only as necessary for shipping/handling limitations; clearly mark for reassembly/coordinated installation.
 - C. Submittals:
 - 1. Submit under provisions of Section 013323.
 - 2. Submit shop drawings for fabrication/erection of miscellaneous metal fabrications including plans/elevations/details of sections and connections; show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
 - D. References:
 - 1. Design, fabrication and erect in accord with the SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDING as amended to date, and the CODE OF STANDARD PRACTICE, latest edition, as adopted by the AISC. If herein specified to the contrary, these specifications govern and supercede the standards.
 - 2. Fabrication and erection conforming to standards of National Association of Architectural Metal Manufacturers.

PART 2 - PRODUCTS:

- 2.01 Metal Surfaces.
For fabrication of miscellaneous metal work exposed to view, use only materials smooth/free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
- 2.02 Steel Plates, Shapes, and Bars.
ASTM A36.
- 2.03 Brackets, Flanges and Anchors.
Cast or formed metal of same type material/finish as supported beams, columns, or rails, unless otherwise indicated.
- 2.04 Concrete Inserts.
Threaded or wedge type; galvanized ferrous castings, malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts/washers/shims required, hot-dip galvanized, ASTM A 153.

DIVISION 05. METALS

SECTION 055000 METAL FABRICATIONS (CONTINUED)

- 2.05 Bolts: ASTM A-307.
- 2.06 Welding Electrodes: E70XX.
- 2.07 Expansion Anchors:
 - A. Equal to Hilti KB-TZ Kwik Bolts TZ Expansion Anchors.
 - B. Diameter as noted on the drawings, length as noted or required to accommodate job conditions.
- 2.08 Grout.
 - A. Metallic non-shrink grout, premixed, factory-packaged, ferrous aggregate grout complying with CE CRD-C588, Type M.
 - B. Non-shrink non-metallic grout, premixed, factory-packaged, non-staining, non-corrosive, non-gaseous; complying with CE CRD-C588; specifically recommended by manufacturer for interior/exterior applications of type specified here.
- 2.09 Metal Primer Paint:
Red oxide metal primer, performance equivalent to TT-P-86, (Duron "Dura Clad" Damp Proof Red Oxide Metal Primer, 33-250, or approved equivalent).
- 2.10 Fabrication and Workmanship.
 - A. Use materials of the size/thickness shown; if not shown, required size/thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
 - B. Form exposed work true to line/level with accurate angles/surfaces /straight sharp edges; ease exposed edges ot radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or impairing work.
 - C. Weld corners/seams continuously complying with AWS recommendations. At exposed connections, grind exposed welds smooth/flush to match and blend with adjoining surfaces.
 - D. Form exposed connections with hairline joints, flush/smooth, using concealed fasteners where possible. Use exposed fasteners of type shown; if not shown, Phillips flat-head (countersunk) screws/bolts.
 - E. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate/space anchoring devices to provide adequate support for intended use.
 - F. Cut/reinforce/drill/tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- 2.10 Shop Painting:
 - A. Shop paint all miscellaneous metal work.
 - B. Remove scale/rust/other deleterious materials before applying shop coat. Clean off heavy rust and loose mills scale in accordance with SSPC SP-2 "Hand Tool Cleaning", or SP-3 "Power Tool Cleaning", or SP-7 "Brush-Off Blast Cleaning". Remove oil/grease/contaminants in accordance with SP-1 "Solvent Cleaning".
 - C. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions at rate to provide uniform dry film thickness of 2/0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces. Apply one (1) shop coat to fabricated metal items;/ apply two (2) coats of paint to surfaces inaccessible after assembly/erection.
- 2.11 Steel pipe bollards:
 - A. Standard steel pipe.
 - B. Location, quantity, length, and embedment as detailed on the drawings.

DIVISION 05. METALS

SECTION 055000 METAL FABRICATIONS (CONTINUED)

PART 3 - EXECUTION:

- 3.01 Standards:
Design, fabricate and erect in accord with the SPECIFICATIONS FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDING as amended to date, and the CODE OF STANDARD PRACTICE, latest edition, as adopted by the AISC. If herein specified to the contrary, these specifications govern and supercede the standards.
- 3.02 Shop connections:
Riveted, except where welding is indicated on drawings.
- 3.03 Welding:
Electric arc process using qualified welders only.
- 3.04 Government anchors:
For all beams resting on masonry walls.
- 3.05 Bearing plates:
A. For structural members resting on masonry wherever end reaction produces unit masonry stress greater than 140# per square inch.
B. Where also noted on drawings.
- 3.06 Field measurements:
Take all measurements in field as required to verify or supplement dimensions indicated and to assure responsibility for the fit of the work.
- 3.07 Planning and milling:
Mill columns and stiffeners to give full bearing over the cross section.
- 3.08 Preparation.
A. Coordinate and/or furnish anchorages, setting drawings, diagrams, templates, instructions, and /or directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors, to be embedded in concrete or masonry construction. Coordinate delivery to project site.
B. Field measurements:
Take all measurements in field as required to verify or supplement dimensions indicated and to assure responsibility for the fit of the work.
- 3.09 Shop painting:
A. Remove flux deposit and slag from welds before application of shop coat of primer, as required by AISC specifications.
B. Apply one shop coat of primer paint to steel by spray, dipping, or other method to provide continuous dry paint film thickness of not less than 0.50 mil.
- 3.10 Installation.
A. General:
1. Level columns, beams, and lintels and align all work before final installation.
2. Do not cut or alter steel and connections without approval.
3. Drifting to match unfair holes will not be permitted.
4. Use twist drills to enlarge holes to permit proper connections. However, reaming that weakens members, prohibits filling holes properly or adjusting accurately is not permissible.
5. Unfinished bolts drawn up tight, with threads set to prevent loosening. Use washers where necessary.
B. Fastening to In-Place Construction:
1. Provide anchorage devices/fasteners necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other

DIVISION 05. METALS

SECTION 055000 METAL FABRICATIONS (CONTINUED)

- connectors as required.
 - 2. Fit exposed connections accurately together to form tight hairline joints; weld connections not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld/cut/abrade surfaces of exterior units which have been hot-dip galvanized after fabrication, intended for bolted or screwed field connections.
 - C. Field Welding:
Comply with AWS Code for procedures of manual shielded metal-arc welding/appearance and quality of welds made/methods used in correcting welding work.
 - D. Setting Loose Plates:
Clean concrete/masonry bearing surfaces of bond-reducing materials, roughen to improve bond to surfaces; clean bottom surface of bearing plates. Set loose leveling/bearing plates on wedges or other adjustable devices. After bearing members have been positioned/plumbing, tighten anchor bolts. Do not remove wedges/shims; if protruding, cut-off flush with edge of bearing plate before packing with grout. Use metallic non-shrink grout in concealed locations not exposed to moisture; use non-metallic non-shrink grout for exposed locations, unless otherwise indicated. Pack grout solidly between bearing surfaces/plates to insure no voids remain.
- 3.11 Adjust and Clean.
Cleaning/touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal.

End of Section

DIVISION 06. CARPENTRY

SECTION 060100 ROUGH CARPENTRY

PART 1 - GENERAL

- 1.01 Rough carpentry includes carpentry not specified as part of other sections and generally not exposed, unless otherwise indicated. Types of work in this section include rough carpentry for:
- A. Rough framing.
 - B. Miscellaneous plywood sheathing.
 - C. Nailers.
 - D. Sleepers.
 - E. Miscellaneous wood blocking.
- 1.02 Standards:
- A. Lumber standards:
Comply with Southern Forest Products Association, PS 20, and other applicable rules of respective grading and inspecting agencies for species and products indicated.
 - B. Plywood product standards:
Comply with PS 1 (ANSI A 199.1) or, for products not manufactured under PS 1 provisions, with applicable APA Performance Standard for type of panel indicated.
 - C. Performance requirements for fire retardant treated wood:
 - 1. Fire Rating: Provide UL listed Class A/Class I fire retardant treated wood products exhibiting maximum flame spread of 25, when tested in accordance with ASTM E 84, NFPA 255, or UL 723, and no evidence of significant combustion when test is extended for and additional 20 minutes.
 - 2. Corrosive Properties:
Carbon steel, galvanized steel, aluminum, copper, and red brass in contact with fire retardant treated wood products to exhibit maximum corrosion rates of one (1) mil (0.025 mm) per year when tested in accordance with MIL-L-19140.
 - 3. Production and kiln drying after treatment monitored by Timber Products Inspection, Inc.
- 1.03 References:
- A. American Lumber Standard Committee - Softwood Lumber Standards.
 - B. APA - Design and Construction Guide for Residential and Commercial Uses; APA - The Engineered Wood Association.
 - C. AWWA C20 - Structural Lumber--Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association.
 - D. AWWA C27 - Plywood Fire Retardant Treatment by Pressure Process; American Wood-Preservers' Association.
 - E. AWWA P17 - Fire Retardant Formulations; American Wood-Preservers' Association.
 - F. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - G. ASTM D 3201 - Standard Test Method for Hygroscopic Properties of Fire- Retardant Wood and Wood-Base Products.
 - H. MS MIL-L-19140 - Fire Retardant Wood Preservative Chemicals.
 - I. NFPA 255 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
 - J. NLGA - Grading Rules; National Lumber Grades Authority.
 - K. SPIB - Standard Grading Rules for Southern Pine Lumber; Southern Pine Inspection Bureau.
 - L. UL 723 - Standard Method of Test for Surface Burning Characteristics of Building Materials.
 - M. WCLB - Standard Grading and Dressing Rules; West Coast Lumber Inspection Bureau.
 - N. WWPA - Western Lumber Grading Rules; Western Wood Products Association.
- 1.04 Quality Assurance for Fire Retardant Treated Wood:
- A. Regulatory Requirements: Fire retardant chemicals registered for use as wood preservative by U. S. Environmental Protection Agency.
 - B. Certifications: Test results of fire performance, strength, and corrosive properties of fire retardant treated wood products issued in numbered National Evaluation Services Report.
- 1.05 Submittals:
- A. Submit treatment manufacturer's instructions for proper use of each type of treated

- material.
 - B. For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
 - C. For water-borne preservatives, include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.
 - D. Certificates: Submit wood treater's specifications showing compliance with referenced standards.
 - E. Fire retardant treated wood:
National Evaluation Report indicating limitation of use, high temperature strength testing, and flame spread, corrosion, and hygroscopic properties.
- 1.06 Product Handling/Delivery/Storage:
Keep materials dry at all times; protect against exposure to weather and contact with damp/wet surfaces. Stack lumber/plywood and provide air circulation within stacks.
- 1.07 Job Conditions:
Fit carpentry work to other work; scribe/cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow proper attachment of other work.
- 1.08 Samples:
- A. Submit 6-inch-long samples of each type of wood to be treated.
 - B. Supply samples for finishing where finish samples are required by other sections of the specifications.

PART 2 - PRODUCTS

- 2.01 Factory mark each piece of lumber with type/grade/mill/grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
- 2.02 Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
- 2.03 Provide dressed lumber, S4S, unless otherwise indicated. Provide seasoned lumber with 19% maximum moisture content at time of dressing.
- 2.04 Framing lumber (2" through 4" thick):
- A. For light framing (less than 6" wide), provide "Stud" grade lumber for stud framing and "Standard" grade for other light framing, any species.
 - B. For structural framing (6" and wider, 2"-4" thick), provide following grade and species: #2 grade or better, MC-19, Douglas Fir (WCLB or WWPA) or Southern Pine (SPIB).
 - C. Non-structural members:
#3 grade or better, MC-19.
- 2.05 Exposed Framing Lumber (2" through 4" thick):
In finished spaces, where framing will not be concealed by other work, provide following grade/species:
- A. Douglas Fir, Appearance Framing (WWPA).
 - B. Southern Pine, Appearance Grade, Kiln Dried (SPIB).
- 2.06: Boards (less than 2" thick):
- A. Exposed Boards:
Where boards will be exposed in the finished work, provide moisture content of 15% maximum, "MC-15" or "K-D". Where painted finish is indicated, provide Southern Pine, #2 boards (SPIB), or Douglas Fir Construction Boards (WCLB or WWPA).
 - B. Concealed Boards:
Where boards will be concealed by other work, provide lumber of 19% maximum moisture content (S-DRY), Southern Pine #3 Boards (SPIB) or any species graded standard boards.
 - C. Board Sizes:
Provide sizes indicated; if not indicated (for sheathing, subflooring and similar uses), provide 1" x 8" boards.
- 2.07 Miscellaneous Lumber:
- A. Provide wood for support or attachment of other work including cant strips, bucks, nails, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, moisture content of 19% maximum for lumber items not specified to receive wood preservative treatment.
 - B. Grade:
Construction grade light framing size lumber of any species or board size lumber as

DIVISION 06. CARPENTRY

SECTION 060100 ROUGH CARPENTRY (CONTINUED)

- required. Provide #2 boards (SPIB or WWPA).
- 2.08 Plywood:
- A. Trademark:
Identify each plywood panel with appropriate APA trademark.
 - B. Plywood Sheathing:
APA rated sheathing.
 - C. Exposure Durability Classification:
Exterior.
 - D. Span Rating:
24/16.
 - E. Plywood Backing Panels:
For mounting electrical/telephone equipment, provide fire retardant treated plywood panels with grade designation, APA C-D Plugged INT with exterior glue, in thickness indicated, or if not indicated not less than 1/2".
 - F. MDF:
60 lb., medium density fiberboard for mounting decorative metal laminate finishes in thickness indicated, but not less than 1/2". Do not use plywood, low density particle board, solid lumber, gypsum board, or concrete.
- 2.09 Miscellaneous Materials:
- A. Provide size/type/material/finish as indicated/recommended by applicable standards complying with Federal Specifications or nails, staples, screws, bolts, nuts, washers, and anchoring devices. Provide metal hangers, framing anchors of size/type recommended by manufacturer for each use including recommending nails.
 - B. Where rough carpentry work is exposed to weather, in ground contact, or area of high relative humidity, provide fasteners/anchorage with hot-dip zinc coating (ASTM A-153).
- 2.10 Preservative Wood Treatment:
Where lumber or plywood is indicated as "Treated Wood" or Pressure Treated Wood", or specified herein to be treated, comply with applicable requirements or AWPB Standards C2 (Lumber) and C9 (Plywood) and of AWPB Standards listed below. Mark each treated item with AWPB Quality Mark Requirements.
- A. Pressure treat above and below ground items with water-borne preservatives complying with AWPB LP-2. After treatment kiln-dry to maximum moisture content of 19%. Treat indicated items and the following:
Blocking, stripping, and similar concealed member in contact with masonry or concrete.
 - B. Pressure treat wood members in contact with ground with water-borne preservatives for ground contact use complying with AWPB LP-22. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces with heavy brush coat of same chemical used for treatment. Inspect piece of treated lumber/plywood after drying; discard damaged/defective pieces.
- 2.11 Fire Retardant Wood:
- A. Manufacturers:
Provide fire-retardant wood treatment by or licensed by one of the following:
 - 1. Hoover Treated Wood Products, Inc.
 - 2. Hickson Corporation DRICON Fire Retardant Treated Wood Products. ASD.
 - 3. Chemical Specialties, Inc.
 - 4. Or approved equal.
 - B. Fire Retardant Treated Dimension Lumber:
 - 1. Southern yellow pine.
 - 2. Grading:
 - A. Structural members: #2, MC 19.
 - B. Non-structural members: #3, MC-19.
 - C. Grade marked.
 - D. Sizes: Indicated on drawings.
 - E. Lumber in direct contact with concrete, masonry, or soil to be exterior rated.
 - F. Kiln dry lumber to 19 percent or less moisture content after treatment.
 - C. Fire retardant treated plywood:

DIVISION 06. CARPENTRY

SECTION 060100 ROUGH CARPENTRY (CONTINUED)

1. Species: Southern yellow pine.
2. APA rated underlayment, structural grade, exposure 1.
3. Product standard PS 1-83.
4. Thicknesses indicated on drawings or as required to match existing adjacent materials.
5. Kiln dry plywood to 15 percent or less moisture content after treatment.
- D. Fire Retardancy:
 1. Lumber: Type "A" (low-hygroscopic) treatment in accordance with ASTM D 3201 and AWWA C 20.
 2. Plywood: Type "A" (low-hygroscopic) treatment in accordance with ASTM D 3201 and AWWA C 27.
 3. Flame spread, when tested in accordance with ASTM E 84 and UL 723: Not more than 25.
 4. Smoke toxicity shall be no more than that of untreated wood.
 5. Each piece of treated wood shall bear the UL Classification Mark certifying flame spread rating.
 6. When test is extended for 20 additional minutes (30 minutes total), the flame front shall not extend more than 10.5 feet from the center line of the burner and there shall be no evidence of significant progressive combustion.
 7. Treatment formulation shall contain no halogens, sulfates, chlorides, or ammonium phosphate.
 8. Reviewed by the National Evaluation Service, Inc. for structural use at elevated temperatures.
 9. Production and kiln drying after treatment monitored by Timber Products Inspection, Inc.

PART 3 - EXECUTION

- 3.01 Installation:
 - A. Discard units of material with defects which might impair quality of work and units which are too small to use in fabricating work with minimum joints or optimum joint arrangement.
 - B. Set carpentry work accurately to required levels/lines, with members plumb/true and accurately cut and fitted.
 - C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards. Countersink nail heads on exposed carpentry work and fill holes.
 - D. Use common wire nails, except as otherwise indicated; finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or receive finish materials. Make tight connections between members; install fasteners without splitting wood; predrill as required.
- 3.02 Wood grounds, nailers, blocking, and sleepers:
 - A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.
 - B. Attach to substrates as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise shown. Build into masonry during installation of masonry work. Anchor to formwork before concrete placement.
 - C. Provide permanent grounds of dressed/preservative treated/key-beveled lumber not less than 1.1/2" wide, thickness required to bring face to exact thickness of finish material involved. Remove temporary grounds when no longer required.
- 3.03 Wood furring:
 - A. Install plumb/level with closure strips at edges and openings. Shim with wood as required for tolerance of finished work.
 - B. Firestop furred spaces on walls at each floor level, with wood blocking or incombustible materials, accurately fitted to close furred spaces.
- 3.04 Installation of plywood:

DIVISION 06. CARPENTRY

SECTION 060100 ROUGH CARPENTRY (CONTINUED)

- A. Comply with applicable recommendations contained in Form No. E 304, "APA Design/Construction Guide - Residential & Commercial", for types of plywood products and applications indicated.
 - B. Nail plywood backing panels to supports.
- 3.05 Installation of fire retardant treated wood:
- A. Field-cut lumber for required lengths, drilled holes, or joining cuts only; field ripping or milling of lumber is prohibited.
 - B. Secure lumber with fasteners of galvanized steel or other corrosion resistant material.
 - C. Plywood:
 - 1. General:
 - A. Comply with nailing schedules and panel spacings specified in APA "Design and Construction Guide for Residential and Commercial Uses", including use of plyclips where required, unless otherwise indicated.
 - B. Secure plywood panels with fasteners of galvanized steel or other corrosion resistant material; use of staples is prohibited.
 - C. Plywood: Fire-retardant-treated plywood can be cut in any direction.
 - 2. Installation:
 - A. Install with face panels perpendicular to supports.
 - B. Stagger end joints.
 - C. Use minimum #8 galvanized or stainless steel screws, 6 inches on centers at edges, 12 inches on centers at intermediate supports.
 - D. All end joints must occur over supports.
 - E. Maintain minimum 1/32 inch gap at all joints.
 - F. Avoid deflection between supports prior to nailing.

End of Section

DIVISION 07 MOISTURE PROTECTION

SECTION 072116 FIBERGLASS INSULATION

PART 1 - GENERAL

- 1.01 Work Included:
Fiberglass batt and roll insulation.
- 1.02 References:
- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - B. ASTM C 553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - C. ASTM C 612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - D. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - E. ASTM C 764 - Standard Specification for Mineral Fiber, Loose-Fill Thermal Insulation.
 - F. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - G. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - H. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
 - I. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
 - J. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
 - K. Federal Specification HH-I-521F: Insulation Blankets, Thermal (Mineral Fiber, For Ambient Temperatures).
 - L. Federal Specification HH-I-558B: Insulation, Blocks, Blankets, Felts, Sleeving (Pipe and Tube Covering), and Pipe fitting Covering, Thermal (Mineral Fiber, Industrial Type)
 - M. National Fire Protection Association (NFPA) Life Safety Code
 - N. Underwriters Laboratories (UL) - UL 2079 Standard test method for fire resistance of Building Joint Systems.
- 1.03 Submittals:
- A. Submit under provisions of Section 013323.
 - B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- 1.04 Quality Assurance:
- A. Manufacturer Qualifications: Manufacturer with a minimum of ten years experience manufacturing products in this section shall provide all products listed.
 - B. Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five years experience successfully installing insulation on projects of similar type and scope as specified in this section.
 - C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.
- 1.05 Delivery, Storage, and Handling:
- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
 - B. Storage: Store materials in dry locations with adequate ventilation, free from water, and in such a manner to permit easy access for inspection and handling.
 - C. Handling: Handle materials to avoid damage.
- 1.06 Sequencing:
- A. Coordinate with the installation of vapor retarders and air seal materials if specified in other sections.
 - B. Ensure that products of this section are supplied to affected trades in time to prevent

- interruption of construction progress.
- 1.07 Project Conditions:
Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 - PRODUCTS

- 2.01 As manufactured by Owens-Corning Fiberglas Corporation, Manville Building Products Group, Certainteed Corporation, or approved equal.
- 2.02 Applications:
- A. Over existing plaster ceilings.
- B. All other locations as shown on the drawings.
- 2.03 Thermal Batt Insulation:
- A. Fiber glass building insulation for walls, ceilings, attics and floors.
- B. To comply with ASTM C 665; preformed glass fiber batt insulation:
- 2.04 High-Density Thermal Insulation:
High-Performance Fiber Glass Building Insulation. Fiber glass building insulation for walls, ceilings, attics and floors. Complies with ASTM C 665; preformed glass fiber batt insulation:
- A. Facing: ASTM C 665 Type I Unfaced.
1. Fire Hazard Classification: ASTM E 84:
- A. Maximum Flame Spread Index; 25.
- B. Maximum Smoke Developed Index; 50.
2. Noncombustibility: ASTM E 136, passes.
- B. Thermal Resistance: single thickness or combination of the following as required to match R value stated on the drawings (Cathedral Ceiling Batts):
1. Thickness and thermal resistance:
- a. 3-1/2 inches thick: R-value of 11.00.
- b. 3-5/8 inches thick: R-value of 13.00.
- c. 6-1/4 inches thick: R-value of 19.00.
- d. 6-1/2 inches thick: R-value of 22.0.
- e. 8-1/2 inches thick: R-value of 25.0.
- f. 9 inches thick: R-value of 26.0.
- g. 10 inches thick: R-value of 30.00.
- h. 12 inches thick: R-value of 38.00.
2. One of the following:
- A. Width: 15 inches (381 mm).
- B. Width: 15-1/4 inches (387 mm).
- C. Width: 23 inches (584 mm).
- D. Width: 23-1/4 inches (591 mm).

PART 3 - EXECUTION

- 3.01 Examination:
- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all exterior and interior wall, partition, and floor/ceiling assembly construction has been completed to the point where the insulation may correctly be installed.
- C. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 3.02 Preparation:
- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- 3.03 Installation:
- A. Install in accordance with manufacturer's instructions.
- B. Install in exterior spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services

DIVISION 07 MOISTURE PROTECTION

SECTION 072116 FIBERGLASS INSULATION (CONTINUED)

- within plane of insulation.
 - E. If vapor barrier or facer is specified, install insulation with vapor barrier installed facing the warm side. Seal or tape joints as required.
- 3.04 Protection:
- A. Protect installed products until completion of project.
 - B. Touch-up, repair or replace damaged products before Substantial Completion.

End of Section

DIVISION 07. MOISTURE PROTECTION

SECTION 079200 CAULKING AND SEALANTS

PART 1 - GENERAL

- 1.01 At areas of new work.
- 1.02 Interior:
- A. Joints at dissimilar materials.
 - B. General use.
 - C. Where noted on drawings.
- 1.03 Other caulking to make building watertight in areas of new work.
- 1.04 Submittals:
Furnish manufacturer's specifications / recommendations / installation instructions for each type material required. Include manufacturer's published data, letter of certification, or certified test laboratory report indicating each material complies with requirements and intended generally for applications shown.
- 1.05 Warranty:
Furnish a written warranties as specified below, covering loss of adhesion or cohesion, deterioration, leaking, and other defects. In addition, warrant that material has been installed according to manufacturer's written specifications.
Prior to the start of work, the Manufacturer shall provide a full-time employee to verify that materials are suitable for intended applications, will provide long-term adhesion, and are compatible when dissimilar materials intersect or contact one another. No claims for additional costs shall be allowed because of changes of sealants required to comply with the provisions of this paragraph.
- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
 - B. Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period. Warranty Period: Two years from date of Substantial Completion.
 - C. Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period. Warranty Period: 10 years from date of Substantial Completion.
 - D. Warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.

PART 2 - PRODUCTS

- 2.01 All items:
- A. Oakum joint filler:
 - 1. Untreated hemp or jute fiber rope, free of oil / tar / and / or other compounds which might stain surfaces, contaminate joint walls, or not be compatible with

DIVISION 07 MOISTURE PROTECTION

SECTION 079200 CAULKING AND SEALANTS (CONTINUED)

- sealants.
- 2. Hand packed, dry spun.
- B. Sealant backer rod:
Compressible rod stock of polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible / permanent / durable / non-absorptive material recommended for compatibility with sealant by sealant manufacturer.
- C. Joint primer / sealer:
Provide type of joint primer / sealer recommended by the sealant manufacturer for the joint surfaces to be primed or sealed.

2.02 General use, exterior:

- A. Silicone Sealant Compound:
 - 1. Compound shall be a single-component, silicone-based sealant. Cured sealant shall have the following physical properties:

<u>Property</u>	<u>Test Method</u>	<u>Value</u>
Tensile Strength	ASTM D412	170 psi
Tear Strength	ASTM D624	27 psi
Hardness (Shore A)	ASTM D642	30 (min)
Peel Strength	MIL-S-8802D	32 lb/in.

- 2. Sealant shall meet or exceed all requirements of MIL-S-8802 and FS-TT-S-001543A.
- 3. One of the following:
 - A. "Dow Corning 795" as manufactured by Dow Corning Corp., Midland MI 48640.
 - B. "Silpruf 2000" as manufactured by General Electric Construction Products.
 - C. "Pecora 864" as manufactured by Pecora
 - D. "CRL 95C" as manufactured by CR Lawrence
- 4. Color shall be as approved by Designers and Owner.

2.03 General interior use, non-elastomeric sealants, paintable - use at door frames etc.:

Acrylic Emulsion Sealant:
Acrylic emulsion or latex rubber modified acrylic emulsion sealant compound; permanently flexible, non-staining / non-bleeding; recommended by manufacturer for general interior exposure and capable of being painted. Products offered by manufacturers to comply with requirements include:

- Sonolac by Contect-Sonneborn
- DAP Acrylic Latex caulk by DAP, Inc.
- Easaply by W.R. Meadows, Inc.
- AC-20 Acrylic Latex by Pecora
- Sikaflex 420 by Sika Chemical
- Acrylic Latex Caulk by Tremco, Inc.

PART 3 - EXECUTION

- 3.01 Installation:
 - A. Clean surfaces to be caulked, free from mortar and other foreign matter.
 - B. Allow surfaces to dry before caulking.

DIVISION 07 MOISTURE PROTECTION

SECTION 079200 CAULKING AND SEALANTS (CONTINUED)

- C. Fill surfaces deeper than 3/4 inch with oakum or compressible backer rod for elastomeric sealants, packed tight.
- D. Force compound into joints and recessed with gun having nozzle of proper size and at sufficient pressure to fill joints to depths shown; if not shown, as recommended by sealant manufacturer but within following general limitations, measured at center of bead:
 - 1. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but never more than 1/2 inch deep not less than 1/4 inch deep.
- E. Form concave joints, slightly behind adjoining materials, unless otherwise shown, so compressed units will not protrude from joint.
- F. Remove excess material.
- G. Remove stains and soil from other work caused by this work.
- H. Color selected by architect from a list of manufacturer's full range of colors.

End of Section

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

- 1.01 Work Included:
 - A. Aluminum frames.
 - B. Aluminum doors.
 - C. Anchorage.
 - D. Caulking.
 - E. Samples.
 - F. Shop drawings.
- 1.02 Related Sections:
 - A. Finished Hardware (Section 087000).
 - B. Glass and Glazing (Section 088100).
 - C. Caulking and Sealants (Section 079200).
 - D. Sliding Automatic Entrances (Section 084229).
- 1.03 References:
 - A. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
 - B. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - C. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
 - D. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 - E. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - G. ASTM E 331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
 - H. ASTM E 1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- 1.04 Shop Drawings and Submittals:
 - A. Submit under provisions of Section 013323.
 - B. Submit manufacturer's specifications / standard details / installation recommendations for components of aluminum entrances / storefronts required for project, including data that products have been tested and comply with performance requirements.
 - C. Submit for fabrication / installation of aluminum entrances / storefronts, including elevations, detail sections of typical composite members, anchorages, reinforcement, expansion provisions, and glazing. Obtain field measurements prior to submission of shop drawings for approval.
 - D. Product Data: Manufacturer's specifications and installation instructions.
 - E. Samples:
 - Aluminum sections for color.
 - D. Entrance Door Hardware Schedule:
 - Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Reinforce frames and doors for all surface applied hardware.
- 1.05 Quality Assurance:
 - A. Installer Qualifications:

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

- An installer which has had successful experience with installation of the same or similar units required for the project and other projects of similar size and scope.
- B. Manufacturer Qualifications:
A manufacturer capable of providing aluminum framed storefront systems that meet or exceed performance requirements indicated and of documenting this performance by inclusion of test reports, and calculations.
- 1.06 Warranty: Submit sample warranty indicating conditions and limitations.
- A. The installer of the glazing system shall warrant for two years from the date of substantial completion the satisfactory performance of the storefront installation. This to include the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc. as it relates to air, water and structural adequacy as called for in the specifications and approved shop drawings.
- B. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.
- C. Doors:
1. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
 2. Warranty Period: Ten years starting on date of installation.

PART 2 - PRODUCTS

- 2.01 Construction:
- A. Extruded aluminum, alloy 6063-T5, or T6 alloy and temper.
 - B. Aluminum frame extrusions to have a minimum wall thickness of .080".
 - C. All exposed work to be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.
 - D. Field measurements:
Take field measurements prior to preparation of shop drawings / fabrication to insure proper fitting of work.
 - E. Comply with applicable provisions of "Metal Curtain Wall, Window, Storefront, and Entrance Guide Specifications Manual" by AAMA.
 - F. All products listed in this section shall be compatible, or produced by the same manufacturer so as to maintain all individual warranties.
- 2.02 Quality assurance:
- A. Storefront framing systems shall be designed to provide for thermal movement of all component materials without causing buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects.
 - B. Test Procedures and Performance:
 1. Air infiltration test:
 - A. Test unit in accordance with ASTM E 283 at static air pressure difference of 6.24 psf.
 - B. Air infiltration shall not exceed .06 cfm per square foot of fixed wall area.
 - C. Water Resistance Test:
 1. Test unit in accordance with ASTM E 331.
 2. There shall be no uncontrolled water leakage at a static test pressure of 12.00 psf.

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SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

2. Uniform Load Deflection Test:
 - A. Test in accordance with ASTM E330.
 - B. Design Wind Loads:

Determine design wind loads applicable to the project from basic wind speed indicated in miles per hour, according ASCE 7, Section 6.5. "Method 2-Analytical Procedure", and the latest edition of the N.C. State Building Code, based on mean roof heights above grade indicated on the drawings.
 - C. Units constructed to withstand Basic Wind Speed (MPH) of 90 mph, both positive and negative as required by the North Carolina State Building Code, Volume I, as calculated from ANSI A58.1, or as determined by boundary layer wind tunnel testing.
 - D. Importance Factor (1.0), Exposure Category (B).
 - E. The storefront system, including anchorage, shall be capable of withstanding wind load design pressures based on the requirements included in the latest edition of the N.C. State Building Code.
 - F. Deflection under design load shall not exceed L/175 of the clear span.
 3. Uniform Load Structural Test:
 - A. Test in accordance with ASTM 330 at a pressure 1.5 times the design wind pressure noted above.
 - B. At conclusion of the test, there shall be no glass breakage, permanent damage to fasteners, storefront parts, or any other damage would cause the storefront to be defective.
 4. System and individual sections proposed for use on the project to be reviewed and approved by the manufacturer prior to submittal of the shop drawings.
- 2.03 Aluminum framing members:
- A. By one of the following:
 1. Kawneer Company, Inc. (www.kawneer.com).
 2. EFCO Corporation. (www.efcocorp.com).
 3. Oldcastle BuildingEnvelope. (www.oldcastlebe.com)
 4. Tubelite, Inc. (www.tubeliteinc.com)
 5. YKK AP America, Inc. (www.ykkap.com)
 - B. Basis of design:

Equal to Kawneer Trifab VG 451T, EFCO 403(T) thermal frames, or approved equal.
 - C. Depth of frame: approximately 4.1/2", unless otherwise noted on the drawings.
 - D. Face dimension shall not be less than 2".
 - E. All units shall be center plane "dry glazed" with gaskets on both exterior and interior of the glass. Frame to accommodate 1" glazing with E.P.D.M. gasket on both exterior and interior utilizing manufacturer's standard elastomeric type spacers and setting blocks.
 - F. Bond Breaker Tape:

Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
 - G. Finish:
 1. Aluminum: AAMA 611, Architectural Class I anodized to 0.0007 inch minimum thickness, dark bronze.
 2. To match finish on sliding automatic entrances.
 - H. Thermal Barrier:
 1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal

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SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

- barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.
- I. Fabrication:
1. Profiles shall be sharp, straight, and free of defects or deformations.
 2. Joints to be accurately fitted, flush, hairline, and waterproof.
 3. Provide means to drain water passing joints, condensation within framing members, and moisture migrating within the system to the exterior.
 4. Provide physical and thermal isolation of glazing from framing members.
 5. Accommodations shall be provided for thermal and mechanical movements of glazing and framing to maintain the required glazing edge clearances.
 6. Provisions shall be made for field replacement of glazing.
 7. Fasteners, anchors, and connection devices are to be concealed from view to the greatest extent possible.
 8. Fabricate components for assembly using manufacturer's standard installation instructions.
 9. After Fabrication:
Clearly mark components to identify their locations in the project according to the approved final shop drawings.
- 2.04 Aluminum doors:
- A. Performance Requirements:
1. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
 2. Air Infiltration: For a single door, test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 psf. Door shall not exceed 0.01 cfm per square foot.
 3. Uniform Structural Load: For a single door, test specimen shall be tested in accordance with ASTM E 330. Plus or minus 67.5 pounds per square foot.
 4. Water Resistance: For a single door, test specimen shall be tested in accordance with ASTM E 331 at a pressure differential of 3.75 psf. No leakage.
 5. Large Missile Impact: Single impact. Pass.
 6. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.
- B. Manufacturer:
As manufactured and supplied by manufacturer of the aluminum frames, or approved equal.
- C. Door Opening Sizes:
As indicated on the drawings.
- D. Construction:
1. Door Thickness: 1-3/4 inches.
 2. Stiles and Rails:
Material: Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes, 0.125-inch minimum wall thickness, 1-piece.
 3. Stile Width: Medium stile configuration, nominal 4-3/4 inches wide.
 4. Rail Width:

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SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

- A. Top: Nominal 6-1/2 inches.
- B. Bottom: Nominal 10 inches.
- 5. Corners:
 - A. True mortise and tenon joints.
 - B. Full-width 3/8-inch diameter galvanized steel tie rods secured with locking hex nuts.
 - C. Welding of Joints: Not permitted.
- 6. Mid Rail:
 - A. Width: 6-1/2 inches.
 - B. One-piece extrusion with integral exterior glass stops.
 - C. Secure to vertical stiles with mortise and tenon joints and 3/8-inch diameter galvanized steel tie rod with locking hex nuts.
 - D. Height of mid-rail to allow the glazed panel to be not greater than 43" above the floor, or as required by ICC A117.1-2009 for handicapped accessibility.
- E. Materials:
 - 1. Aluminum Members:
 - A. Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes: ASTM B 221.
 - B. Sheet and Plate: ASTM B 209.
 - C. Wall Thickness: 0.125 inch.
 - D. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
 - 2. Fasteners:
 - A. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
 - B. Compatibility: Compatible with items to be fastened.
 - C. Exposed Fasteners: Oval Phillips head screws with finish matching items to be fastened.
- F. Fabrication:
 - 1. Sizes and Profiles:

Required sizes for door and frame units and profile requirements shall be as indicated on the Drawings.
 - 2. Coordination of Fabrication:

Field measure before fabrication and show recorded measurements on shop drawings.
- G. Assembly:
 - 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
 - 2. Remove burrs from cut edges.
 - 3. Welding: Welding of doors or frames is not acceptable.
- H. Fit:
 - 1. Maintain continuity of line and accurate relation of planes and angles.
 - 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.
- I. Hardware:
 - 1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
 - 2. Reinforce for surface applied hardware.
 - 3. Hardware Schedule:

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SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

- A. As specified in Section 087110.
- B. Concealed adjustable bottom brush:
 - 1. Install door manufacturer's multidirectional adjustable bottom with double nylon brush weatherstripping.
 - 2. Door bottom must be concealed and adjust to accommodate irregular tapered floor conditions.
- J. Anodized Finish:
Class I dark bronze finish, 0.7 mils thick. - to match adjacent framing and sliding automatic entrances.
- K. Glazing:
 - 1. Factory Glazing: 1-inch safety glass insulating units.
 - 2. Design glazing system for replacement of glass.
 - 3. Manufacturer's standard flush glazing system of recessed channels and captive glazing gaskets or applied stops as indicated on the Drawings.
 - 4. Allow for thermal expansion on exterior units.
- 2.05 Fasteners:
All fasteners to be aluminum or stainless steel.
- 2.06 Glazing Sealants:
 - A. As recommended by the manufacturer for joint type, and as follows:
 - B. In accord with ASTM C-920 for Type S, Grade NS, Uses NT, G, A, and O. Single-component neutral curing formulation that is compatible with structural sealant and other system components with which it comes in contact. All as recommended by the structural sealant, weatherseal sealant, and the aluminum framed system manufacturer's for this use.
- 2.07 Joint Sealants:
 - A. Refer to Section 079200 for joint sealants.
 - B. Backer rods:
Closed cell expanded polyethylene, neoprene, or polyurethane rope.
 - C. Sealant color to match frames.
- 2.08 Bituminous paint:
Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30 mil thickness per coat.

PART 3 - EXECUTION

- 3.01 Examination:
 - 1. Examine openings to receive frames and doors, all substrates, structural support, anchorage, and other conditions with installer present, for compliance with requirements for installation tolerances and other conditions affecting the performance of the work.
 - 2. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.
 - 3. Door openings:
Ensure openings to receive doors are plumb, level, square, and in tolerance.
- 3.02 Installation:
 - A. Install all frames and doors in accordance with manufacturer's instructions.
 - B. Cut to fit accurately and properly mate.
 - C. Securely anchor all members to maintain positions permanently when subjected to normal thermal movement, building movement, and wind loads.
 - D. Separate aluminum from other metal or corrodible surfaces from sources of corrosion or

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SECTION 081116 ALUMINUM ENTRANCES AND STOREFRONTS (CONTINUED)

- electrolytic action at points of contact with other materials with bituminous coatings or other means approved by Architect.
- E. Erect plumb and true, in proper alignment and relation to established lines and grades to prevent breakage of glass.
 - F. Solidly caulk, interior and exterior, where all head, jamb, and sill sections are in contact with other materials. All surfaces must be clean and free of foreign matter before applying sealing materials. Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.
 - G. Doors:
 - 1. Install doors plumb, level, square, true to line, and without warp or rack, weathertight in closed position.
 - 2. Install hardware to hardware manufacturer's instructions.
 - 3. Set thresholds in bed of mastic and backseal.
 - 4. Test and adjust for smooth, quiet operation.
 - H. Manufacturer's Field Services:
Upon request, provide periodic site visit by manufacturer's field service representative.
 - I. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
 - J. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.
 - K. Protect installation from damage by other work.
 - L. Remove any protective coatings as directed by the Architect, and clean the aluminum surfaces as recommended by the manufacturer for the type of finish applied.

End of Section

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 083100 CEILING ACCESS PANELS

PART 1 - GENERAL

- 1.01 Section includes - access panels for the following types of installations:
Ceiling access panels for installation in drywall ceilings where shown on the drawings.
- 1.02 Related Sections:
- A. Painting (Section 099000).
 - B. Gypsum Dry Wall (Section 092900).
- 1.03 Submittals:
General: In accordance with conditions Section 013323 of the specifications.
- A. Shop drawings.
 - B. Manufacturer's literature and data.
- 1.04 Quality Assurance:
- A. Provide all access panels for the project by the same source and the same manufacturer.
 - B. Obtain Architect's approval of sizes that may vary slightly from those indicated when they are not in accordance to manufacturer's standards.
- 1.05 Coordination:
Verify sizes for access panels to fit existing ceiling framing locations and indicate on schedule specified under "submittals" article.
- 1.06 Delivery, Storage and Handling:
- A. Package and ship in accordance to manufacturer's recommendations.
 - B. Store in compliance to manufacturer's instructions.
 - C. Store in dry area out of direct sunlight.
- 1.07 Warranty:
- A. Provide manufacturer's written warranty.
 - B. Manufacturer shall warrant all access panels to be free from manufacturing defects in materials and workmanship for a period of one (1) year from the date of final acceptance. Should a product fail to function in normal use within this period, the manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

- 2.01 Manufacturers:
As manufactured by one of the following:
- A. Babcock-Davis.
 - B. Nystrom Building Products, Inc.
 - C. Acudor Products, Inc.
 - D. Milcor, Inc.
 - E. Or approved equal.
- 2.02 Materials:
- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection[and temperature-rise limit] ratings indicated, according to NFPA 252 or UL 10B.
 - B. Basis of design: Babcock-Davis Model "BIT", fire-rated, flush mounted access doors with exposed flanges:
 - 1. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and continuous piano hinge.
 - 2. Locations: Drywall ceiling.
 - 3. Door Size: Nominal 24" x 36".
 - 4. Fire-Resistance Rating: 3 hours for ceilings, 1 hour for non-combustible wood framed assemblies.
 - 5. Temperature-Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
 - 6. Galvannealed Steel Sheet:
 - A. Door Material: Nominal 0.04 inch (1.0 mm), 20 gauge.
 - B. Frame Material: Nominal 0.064 inch (1.6 mm), 16 gauge.
 - C. Finish: Paintable white powder-coat.
 - 7. Latch and Lock: Self-latching door hardware, operated by knurled-knob, with

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SECTION 083100 CEILING ACCESS PANELS (CONTINUED)

- interior release.
- 2.03 Fabrication:
- A. Manufacture each access panel assembly as an integral unit ready for installation.
 - B. Welded construction: Furnish with a sufficient quantity of mounting holes to secure access panels to types of supports indicated.
 - C. Furnish number of latches required to hold door in flush, smooth plane when closed.

PART 3 - EXECUTION

- 3.01 Examination:
- A. Verify conditions are ideal for suitable installation.
 - B. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - C. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 Preparation:
Advise installers of work relating to access panel installation including rough opening dimensions, locations of supports, and anchoring methods. Coordinate delivery with other work to avoid delay.
- 3.03 Installation:
- A. Install access door and frame units per manufacturer's written instructions.
 - B. Position units to provide convenient access to concealed Work requiring access.
 - C. Install frames plumb and level in opening. Secure rigidly in place.
 - D. Set frames to proper alignment with the wall or ceiling.
- 3.04 Adjust and Clean:
- A. Adjust panel after installation for proper operation.
 - B. Remove and replace panels or frames that are warped, bowed, or damaged.

End of Section

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES

PART 1 - GENERAL

- 1.01 Related Documents:
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- 1.02 Summary:
- A. This Section includes the following types of automatic entrances:
1. Exterior and interior, single slide and bi-parting, sliding automatic entrances with access control locking.
 2. Where scheduled, entrances include integral transoms.
- B. Related Sections:
1. Division 7 Sections for caulking to the extent not specified in this section.
 2. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished and installed separately in Division 8 Section.
 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 4. Division 26 Sections for electrical connections provided separately, including conduit and wiring for power to, and control of, sliding automatic entrances.
 5. Division 28 Section "Electronic Safety and Security" for systems not specified in this section.
- 1.03 References:
- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. Underwriters Laboratories (UL):
1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- C. American National Standards Institute (ANSI) / Builders' Hardware Manufacturers Association (BHMA):
1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
 2. ANSI/BHMA A156.5: Standard for Auxiliary Locks and Associated Products.
 3. ANSI Z97.1: Standard for Safety Glazing Materials Used In Buildings - Safety Performance Specifications And Methods Of Test.
- D. Consumer Product Safety Commission (CPSC):
1. CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.
- E. American Society for Testing and Materials (ASTM):
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- F. American Association of Automatic Door Manufacturers (AAADM).
- G. National Fire Protection Association (NFPA):
1. NFPA 101 – Life Safety Code.
 2. NFPA 70 – National Electric Code.
- H. International Code Council (ICC):
1. IBC: International Building Code.
- I. Building Officials and Code Administrators International (BOCA), 1999:
- J. International Organization for Standardization (ISO):
1. ISO 9001 - Quality Management Systems.
- K. National Association of Architectural Metal Manufacturers (NAAMM):
1. Metal Finishes Manual for Architectural and Metal Products.
- L. American Architectural Manufacturers Association (AAMA):
1. AAMA 606.1 – Integral Color Anodic Finishes for Architectural Aluminum.
 2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

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SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

3. AAMA 701 Voluntary Specification for Pile Weatherstripping and Replaceable Fenestration Weatherseals.
- 1.04 Definitions:
- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
 - B. Safety Device: Device that prevents a door from opening or closing, as appropriate.
- 1.05 Performance Requirements:
- A. General:
Provide automatic entrance door assemblies capable of withstanding loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
 - B. Operating Range: Minus 30 deg F (Minus 34 deg C) to 130 deg F (54 deg C).
 - C. Opening-Force Requirements for Egress Doors: Force shall be adjustable; but, not more than 50 lbf (222 N) required to manually set swinging egress door panel(s) in motion.
 - D. Closing-Force Requirements: Not more than 30 lbf (133 N) required to prevent door from closing.
 - E. Sliding automatic entrances specified with access control locking shall be designed to function as follows when set for secure operation:
 1. Entrances shall be normally closed and locked by access control locking system with exterior motion activation system disabled. Interior motion activation system to remain enabled; free egress.
 2. Upon signal from exterior secure activation device, sliding automatic entrances will unlock and open enabling motion activation system. Entrance will be held open as long as an object or pedestrian remains in the activation or safety zones.
 3. Once all activation and safety zones have cleared the entrance will close and re-lock, returning to normal state.
 4. At any time during the cycle emergency egress can be achieved by utilizing the emergency breakaway feature.
- 1.06 Submittals:
- A. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.
 - B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.
 - C. Color Samples for selection of factory-applied color finishes.
 - D. Closeout Submittals:
 1. Owner's Manual.
 2. Warranties.
- 1.07 Quality Assurance:
- A. Installer Qualifications: Manufacturer's authorized representative, with certificate issued by AAADM, who is trained for installation and maintenance of units required for this Project.
 - B. Manufacturer Qualifications:
A qualified manufacturer with a manufacturing facility certified under ISO 9001.
 - C. Manufacturer shall have in place a national service dispatch center providing 24 hours a day, 7 days a week, emergency call back service.
 - D. Certifications: Automatic sliding door systems shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
 1. ANSI/BHMA A156.10.
 2. NFPA 101.
 3. UL 325 listed.
 4. IBC 2012.
 5. BOCA.
 - E. Source Limitations:
Obtain automatic entrance door assemblies through one source from a single manufacturer.
 - F. Product Options:
Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance

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SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - H. Emergency-Exit Door Requirements:
Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.
- 1.08 Project Conditions:
- A. Field Measurements:
General Contractor shall verify openings to receive automatic entrance door assemblies by field measurements before fabrication and indicate measurements on Shop Drawings.
 - B. Mounting Surfaces:
General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
 - C. Other trades:
General Contractor shall advise of any inadequate conditions or equipment.
- 1.09 Coordination:
- A. Templates:
Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.
 - B. Roughing-in: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies, and security access control system. See Division 28 Section "Electronic Safety and Security" for systems not provided under this section.
 - C. System Integration:
Integrate sliding automatic entrances with other systems as required for a complete working installation. Provide electrical interface control capability for activation of sliding automatic entrances by security access system on doors with electric locking.
- 1.10 Warranty:
- A. Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
 - B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
 - C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

- 2.01 Automatic Entrances:
- A. Manufacturers:
 - 1. One of the following:
 - A. Stanley Access Technologies.
 - B. Horton Automatics.
 - C. NABCO Entrances, Inc.
 - D. Approved equal.
 - A. Basis of design:
Stanley Access Technologies; Dura-Glide™ 3000 Series sliding automatic entrances.
 - 1. Contact: Stanley Access Technologies, 429 Shadowdale Lane, Rolesville NC 27571; Phone: 919-480-7009, Fax: 866-289-8215.
 - B. Substitutions: See Division 1, Section 016000 Product Requirements, Heading 1.10 Substitutions.
- 2.02 Materials:
- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Headers, stiles, rails, and frames: 6063-T6.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- 3. Sheet and Plate: ASTM B 209.
- 2.03 B. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Sealants".
Automatic Entrance Door Assemblies:
 - A. General:
Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
 - B. Sliding Automatic Entrances:
 - 1. Bi-Parting Entrances:
 - a. Configuration: Two sliding leaves and two full sidelights.
 - b. Traffic Pattern: Two-way.
 - c. Emergency Breakaway Capability: Sliding leaves and sidelights.
 - d. Mounting: Surface mounted.
- 2.04 Components:
 - A. Framing and Transom Members:
Manufacturer's standard extruded aluminum reinforced as required to support imposed loads.
 - 1. Nominal Size: 1 3/4 inch by 4 1/2 inch (45 by 115 mm).
 - 2. Concealed Fastening: Framing shall incorporate a concealed fastening pocket, and continuous flush insert cover, extending full length of each framing member.
 - 3. Where scheduled, transoms shall be integral to sliding automatic entrance framing system and shall be flush glazed.
 - B. Stile and Rail Doors and Sidelights:
Manufacturer's standard 1 3/4 inch (45 mm) thick glazed doors with extruded-aluminum tubular stile and rail members. Incorporate concealed tie-rods that span full length of top and bottom rails.
 - 1. Glazing Stops and Gaskets: Snap-on, extruded-security aluminum stops and preformed gaskets.
 - 2. Stile Design: Narrow stile; 2 inch (51 mm) nominal width.
 - 3. Bottom Rail Design: Minimum 10 inch (254 mm) nominal height.
 - 4. Muntin Bars: Horizontal tubular rail member for each door; 4 1/4 inch (108 mm) nominal height.
 - C. Glazing:
Provide glazing for sliding automatic entrances as follows:
 - 1. Provide safety glass complying with ANSI Z97.1 and CPSC 16 CFR 1201 for Category II materials.
 - 2. Glass: 1 inch (25 mm) insulated glazing units, with fully tempered panes in all panels. Insulated glass panes shall incorporate a 1/2 inch (13 mm) dehydrated air space.
 - A. Inboard lites:
 - 1. Thickness: 1/4 inch (6 mm).
 - 2. Tint: Clear.
 - B. Outboard lites:
 - 1. Thickness: 1/4 inch (6 mm).
 - 2. Tint: Clear.
 - 3. Thermal coating: Low-E coating on surface #2 capable of providing the following minimum characteristics to the assembly:
 - A. U-Value: 0.45.
 - B. Solar Heat Gain Coefficient (SGHC): 0.25.
 - C. Testing to be in accord with NFRC 100 environmental conditions.
 - D. Headers:
Fabricated from extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- Secure panels to prevent unauthorized access.
 - 1. Mounting: Concealed, with one side of header flush with framing.
 - 2. Capacity: Capable of supporting up to 220 lb (100 kg) per panel, up to four panels, over spans up to 14 feet (4.3 m) without intermediate supports.
 - E. Carrier Assemblies and Overhead Roller Tracks:

Manufacturer's standard carrier assembly that allows vertical adjustment of at least 1/8 inch (3 mm); consisting of urethane with precision steel lubricated ball-bearing wheels, operating on a continuous roller track. Support panels from carrier assembly by load wheels and anti-riser wheels with factory adjusted cantilever and pivot assembly. Minimum two ball-bearing load wheels and two anti-rise rollers for each active leaf. Minimum load wheel diameter shall be 2 1/2 inch (64 mm); minimum anti-rise roller diameter shall be 2 inch (51 mm).
 - F. Thresholds: Manufacturer's standard thresholds as indicated below:
 - 1. Continuous standard tapered extrusion double bevel.
 - 2. All thresholds to conform to details and requirements for code compliance.
 - G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.
- 2.05 Door Operators:
- A. General:

Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated.
 - B. Electromechanical Operators:

Self-contained overhead unit powered by a minimum of 1/4 horsepower, permanent-magnet DC motor with gear reduction drive, microprocessor controller; and encoder.

 - 1. Operation: Power opening and power closing.
 - 2. Features:
 - a. Adjustable opening and closing speeds.
 - b. Adjustable back-check and latching.
 - c. Adjustable braking.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. On/Off switch to control electric power to operator.
 - g. Energy conservation switch that reduces door-opening width.
 - h. Closed loop speed control with active braking and acceleration.
 - i. Adjustable obstruction recycle time delay.
 - j. Self adjusting stop position.
 - k. Self adjusting closing compression force.
 - l. Onboard sensor power supply.
 - m. Onboard sensor monitoring.
 - n. Optional Switch to open/Switch to close operation.
 - 3. Mounting: Concealed.
 - 4. Drive System: Synchronous belt type.
 - C. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 5 amps.
- 2.06 Electrical Controls:
- A. Electrical Control System:

Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed. Systems utilizing external magnets and magnetic switches are not acceptable.
 - B. Performance Data:

The microprocessor shall collect and store performance data as follows:

 - 1. Counter: A non-resettable counter to track operating cycles.
 - 2. Event Reporting: Unit shall include event and error recording including number of

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- occurrences of events and errors, and cycle count of most recent events and errors.
 - 3. LED Display: Display presenting the current operating state of the controller.
 - C. Controller Protection:
The microprocessor controller shall incorporate the following features to ensure trouble free operation:
 - 1. Automatic Reset Upon Power Up.
 - 2. Main Fuse Protection.
 - 3. Electronic Surge Protection.
 - 4. Internal Power Supply Protection.
 - 5. Auto-Resetting sensor supply protection.
 - 6. Motor Protection, over-current protection.
 - D. Soft Start/Stop:
A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
 - E. Obstruction Recycle:
Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.
 - F. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be a software driven handheld interface. The following parameters may be adjusted via the configuration tool.
 - 1. Operating speeds and forces as required to meet ANSI/BHMA A156.10.
 - 2. Adjustable and variable features as specified in 2.5, B., 2.
 - 3. Reduced opening position.
 - 4. Fail Safe/Secure control.
 - 5. Firmware update.
 - 6. Trouble Shooting.
 - a. I/O Status.
 - b. Electrical component monitoring including parameter summary.
 - 7. Software for local configuration tool shall be available as a free download from the sliding automatic entrance manufacturer's internet site. Software shall be compatible with the following operating system platforms: Palm®, Android®, and Windows Mobile®.
- 2.07 Activation and Safety Devices:
- A. Motion Sensors:
Motion sensors shall be mounted on each side of door header to detect pedestrians in the activating zone, and to provide a signal to open doors in accordance with ANSI/BHMA A156.10. Units shall be programmable for bi-directional or uni-directional operation and shall incorporate K-band microwave frequency to detect all motion in both directions.
 - B. Presence Sensors:
Presence sensors shall be provided to sense people or objects in the threshold safety zone in accordance with ANSI/BHMA A156.10. Units shall be self-contained, fully adjustable, and shall function accordingly with motion sensors provided. The sensor shall be enabled simultaneously with the door-opening signal and shall emit an elliptical shaped infrared presence zone, centered on the doorway threshold line. Presence sensors shall be capable of selectively retuning to adjust for objects which may enter the safety zone; tuning out, or disregarding, the presence of small nuisance objects and not tuning out large objects regardless of the time the object is present in the safety zone. The door shall close only after all sensors detect a clear surveillance field.
 - C. Photoelectric Beams:
In addition to the threshold sensor include a minimum of two (2) doorway holding beams.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting. Beams shall be monitored by electrical controls for faults and shall fail safe.
- D. Presence Sensor Monitoring:
Sliding automatic entrances control system shall include a means to verify the functionality of all active presence sensors in accordance with ANSI/BHMA A156.10. A detected fault shall cause automatic operation to cease until the fault is corrected.
- 2.08 Hardware:
- A. General:
Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.
- B. Emergency Breakaway Feature:
Provide release hardware that allows panel(s) to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 50 lbf (222 N) according to ANSI/BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.
1. Emergency breakaway feature shall include at least one adjustable detent device mounted in the top of each breakaway panel to control panel breakaway force.
 2. Limit Arms: Limit arms shall be provided to control swing of non-sliding panels on break-out; swing shall not exceed 90 degrees. Limit arms shall be spring loaded to prevent shock, and include adjustable friction damping.
- C. Access Control Locking System:
Provide access control locking hardware on sliding automatic entrances as follows:
1. System shall include:
 - a. A fail-secure electric solenoid locking device with a self contained solid state electronic control factory mounted inside the header.
 - b. Vertical rod exit devices incorporated into the sliding door panels that prevent breakout until rod is released.
 2. When set for secure operation, the automatic sliding entrance(s) shall electrically latch in the closed position preventing door panels from sliding manually, returning the system to its locked status.
 3. During a power interruption:
 - a. The solenoid lock shall be engaged, preventing the doors from sliding manually.
 - b. Means of egress shall be accomplished by exit device. Exit device shall be concealed vertical rod tamper proof exit device with recessed flush mounted interior release hardware that shall prohibit manual breakout of door(s) from exterior. Flush mounted release hardware shall be concealed within the horizontal muntin bar.
- D. Control Switch:
Provide manufacturer's standard header mounted rocker switches and door position switch to allow for full control of the automatic entrance door. Controls to include, but are not limited to:
1. One-way traffic.
 2. Reduced Opening.
 3. Open/Closed/Automatic.
- E. Power Switch:
Sliding automatic entrances shall be equipped with a two position "On/Off" illuminated rocker switch to control power to the door.
- F. Sliding Weather Stripping:
Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- G. Weather Sweeps: Manufacturer's standard adjustable nylon brush sweep mounted to underside of door bottom.
- 2.09 Fabrication:
- A. General:
Factory fabricates automatic entrance door assembly components to designs, sizes, and

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- thickness indicated and to comply with indicated standards.
1. Form aluminum shapes before finishing.
 2. Use concealed fasteners to greatest extent possible.
 - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - b. Reinforce members as required to receive fastener threads.
- B. Framing:
Provide automatic entrances as prefabricated assemblies.
1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
 3. Form profiles that are sharp, straight, and free of defects or deformations.
 4. Prepare components to receive concealed fasteners and anchor and connection devices.
 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
- C. Doors:
Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators:
Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing:
Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.
- F. Hardware:
Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.
- 2.10 Aluminum Finishes:
- A. General: Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
 - B. Class I, Color Anodic Finish: AA-M12C22A42/A44 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.70 mils minimum complying with AAMA 611-98, and the following:
 1. Color: Dark Bronze.
 2. AAMA 606.1:
 3. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

- 3.01 Inspection:
Examine conditions for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 Installation:
- A. General:
Do not install damaged components. Fit frame joints to produce joints free of burrs and distortion. Rigidly secure non-movement joints.
 - B. Entrances:
Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 1. Install surface-mounted hardware using concealed fasteners to greatest extent

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 084229 SLIDING AUTOMATIC ENTRANCES (CONTINUED)

- 2. possible.
Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
- C. Door Operators:
Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Glazing:
Glaze sliding automatic entrance door panels in accordance with, the Glass Association of North America (GANA) Glazing Manual, published recommendations of glass product manufacturer, and sliding automatic entrance manufacturer's instructions.
- E. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants".
- 3.03 Field Quality Control:
 - A. Testing Services:
Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.
- 3.04 Adjusting:
 - A. Adjust door operators, controls, and hardware for smooth and safe operation, for tight closure, and complying with requirements in ANSI/BHMA A156.10.
- 3.05 Cleaning and Protection:
 - A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish. Comply with requirements in Division 8 Section "Glazing", for cleaning and maintaining glass.

End of Section

DIVISION 08 DOORS, WINDOWS, GLASS

SECTION 087000 FINISHED HARDWARE

PART 1 - GENERAL

- 1.01 Furnishing and installation of finished hardware for complete and proper operation of new doors shown on the plans.
- 1.02 Shop drawings submittals.

PART 2 - PRODUCTS:

- 2.01 The trade names, catalog numbers, etc., mentioned herewith is intended to establish a general quality standard and are not restricted to same. Equals will be considered if not specifically noted otherwise and if prior approval is received from the Architect and substituted materials are compatible with materials specified.
- 2.02 Hardware supplier must be experienced in educational installations and have an organization consisting of members of the American Society of Architectural Hardware consultant (A.H.C.). At least one employee with A.H.C. Membership must be available locally at all times for consultation and service.
- 2.03 The following hardware schedule numbers are taken from catalogs of Stanley, Corbin/ Russwin, Von Duprin, Norton, Rockwood, National Guard, and Glynn Johnson.
- 2.04. Manufacturers' references:

AR	Adams Rite	MC	McKinney
AS	American Specialties	ME	Mohawk Engraving
B	Baldwin	MK	Markar
BE	Best	NR	Norton
BK	Bobrick	NGP	National Guard
BO	Bommer	P	Pemko
BR	Bradley	PR	Precision Hardware
CR	Corbin Russwin	RI	Rixson
D	Detex	RK	Rockwood
FA	Folger Adam	SC	Schlage
FC	Falcon	SA	Sargent
G	Grant	SI	Simplex
GJ	Glynn - Johnson	ST	Stanley
HA	Hager	T	Telkee
I	Ives	VD	Von Duprin
LCN	LCN Closers	Y	Yale
		X	By Others

Note: The references noted above are included as an abbreviation schedule for items that may be specified in Section 1.06, of the following Hardware Schedule. Items by manufacturer's not specifically listed by name or model number in the Hardware Schedule are not to be considered equal to what has been specified unless approved in writing.

2.05	Finishes:			
	US26D	Dull Chrome	626	Satin Chromium Plated
	US32D	Dull Stainless Steel	Alum	Aluminum
	A	Mill Finished Aluminum	605	Bright Brass, Clear Coated
	696	Satin Brass Painted	US3	Polished Brass
	632	Bright Brass	CHA	Charcoal
	628	Satin Aluminum, Clear Anodized	619	Satin nickel, clear coated
	689	Aluminum Painted		

2.06 Hardware schedule:

HEADING #1

Door #1 Enclosed Vestibule to Exterior 3'-0" x 7'-0" x 1.3/4" Alum x Alum

Each to have:

HA	3.0 Ea.	Heavy Weight Butts	BB1168 (4.5" x 4.5") NRP	626
VD	1.0 Ea.	Exit Device	99NL	626
SCH	1.0 Ea.	Cylinder	(To match existing building standard)	626
SCH	1.0 Ea.	Permanent Core	(To match existing building standard)	626
LCN	1.0 Ea.	Closer	4041 XP - SP - CUSH X MC	689
GJ	1.0 Ea.	Overhead Stop	105S	US32D
SCE	2.0 Ea.	Door Position Switch	679-05	AL
			(Extend wiring through frame and stub out at ceiling for future connection by others)	
NGP	1.0 Ea.	Threshold	896S X LS X RCE X OPENING WIDTH	628
NGP	2.0 Ea.	Sweeps	200SA	628

HEADING #2

Door #2 Bi-Parting Sliding Automatic Entry Doors Alum x Alum
Door #3 Bi-Parting Sliding Automatic Entry Doors Alum x Alum

Hardware for automatic sliding aluminum doors to be provided by the door manufacturer.

2.07 Keying:

All locks and cylinders are to be keyed by the Alamance County Maintenance Department.

PART 3 - EXECUTION

3.01 Package each item separately in individual containers, complete with screws, instructions and installation templates. Each container shall be identified with door number and item number corresponding with contractors hardware schedule.

3.02 Properly tag and envelope all keys.

3.03 Installation:

- A. Install hardware in accordance with manufacturer's printed instructions, with all items accurately fitted, securely applied and carefully adjusted.
- B. Upon completion of project and prior to final inspection, hardware supplier shall inspect entire hardware installation and shall advise in writing of all items of hardware that require adjustments for smooth, easy, proper operation.

3.04 Schedules:

Submit complete schedule of finished hardware for approval by the Architect. Schedule each item of hardware required for each door opening or item of equipment listing hardware item number, manufacturer, manufacturer's number or symbol, finish, and special instructions for installation.

3.05 Templates:

Hardware for use with metal doors and frames shall be furnished to template and with metal screws. Supply all necessary templates and template information to plastic laminate covered wood door manufacturer, and metal door and frame manufacturers in ample time to prevent delay on the project.

End of Section

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING

PART 1 - GENERAL

- 1.01 Work included:
- A. Glass for:
 - 1. Aluminum framing.
 - 2. Aluminum entry doors.
 - B. Glazing tape, splines.
 - C. Manufacturer approved sealant, compatible with other glazing materials.
 - D. Cleaning.
- 1.02 Related Sections:
- A. Hollow Metal Doors & Frames (Section 081100).
 - B. Glazing for Service and Teller Window Units (Section 085659).
- 1.03 References:
- A. ANSI Z97.1 - American National Standard for Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
 - B. ASTM C162 - Standard Terminology of Glass and Glass Products.
 - C. ASTM C1036 - Standard Specification for Flat Glass.
 - D. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass -- Kind HS, Kind FT Coated and Uncoated Glass.
 - E. ASTM E1300 - Standard Practice for Determining the Minimum Thickness and Type of Glass Required to Resist a Specified Load.
 - F. ASTM C1172-03 - Laminated Architectural Flat Glass.
 - G. ASTM E330-02 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - H. ASTM E774-97 - Sealed Insulating Glass Units.
 - I. NFPA 80-06 - Fire Doors and Windows.
 - J. Safety Glazing Certification Council (SGCC): Certified Products Directory (Issued Semi-Annually).
 - K. N.C. State Building Code.
 - J. N.C. Energy Conservation Code - latest edition.
- 1.04 System Description:
- A. Design Requirements:

Provide glazing systems capable of withstanding normal thermal movements, windloads and impact loads, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.
 - B. Provide glass products in the thicknesses and strengths (annealed or heat-treated) required to meet or exceed the following criteria based on project loads and in-service conditions per ASTM E1300.
 - 1. Minimum thickness of annealed or heat-treated glass products is selected, so the worst-case probability of failure does not exceed the following:
 - A. 8 breaks per 1000 for glass installed vertically or not over 15 degrees from the vertical plane and under wind action.
 - B. 1 break per 1000 for glass installed 15 degrees or more from the vertical plane and under action of wind and/or snow.
- 1.05 Submittals:
- A. Submit manufacturer's product data sheet and glazing instructions.
 - B. Glazing contractor shall obtain compatibility and adhesion test reports from sealant manufacturer, indicating that glazing materials were tested for compatibility and adhesion with glazing sealant, as well as other glazing materials including insulating units.
 - C. Glazing Contractor shall provide test reports showing that the glass meets the requirements of any security test reports specified on drawings.
- 1.06 Labels:
- A. Temporary labels:
 - 1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
 - 2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

- 3. Temporary labels shall remain intact until glass is approved by the Architect and Owner's Representative.
- B. Permanent labels:
 - 1. Locate in corner for each pane.
 - 2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
 - A. Tempered glass.
 - B. Laminated glass or have certificate for panes without permanent label.
 - C. Organic coated glass.
- 1.07 Quality Assurance:
 - A. Comply with published recommendations of glass product manufacturers and organizations below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.
 - 1. GANA Publications.
 - 2. AAMA Publications.
 - B. Safety glass products to comply with CPSC 16 CFR Part 1201 for Category II materials.
 - C. Single-source fabrication responsibility: All glass fabricated for each type shall be processed and supplied by a single fabricator.
- 1.08 Delivery, Storage and Handling:
 - A. Comply with manufacturer's instruction for receiving, handling, storing and protecting glass & glazing materials.
 - B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
 - D. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coating on glass.
 - E. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations of venting and sealing.
- 1.09 Project / Site Conditions:
 - A. Environmental Requirements: Installation of glass products at ambient air temperature below 40 degrees F (4.4 degrees C) is prohibited.
 - B. Field Measurements: When construction schedule permits, verify field measurements with drawing dimensions prior to fabrication of glass products.
- 1.10 Warranty:
 - A. Provide a written warranty from date of manufacture for tempered glass.
 - B. Laminated glass units to remain laminated for 5 years.
 - C. Insulated panels shall be warranted for a period of 10 years from the date of installation that the insulating glass units will not develop material obstructions of vision on the internal glass surfaces resulting from dust or film formation caused by failure of the seal due to faulty manufacturing. All defective units shall be replaced at no cost to the Owner within the warranty period.

PART 2 - PRODUCTS

- 2.01 Manufacturers:

Manufacturer is used in this section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced standards.

 - A. Oldcastle Glass.
 - B. Guardian Industries.
 - C. Pilkington.
 - D. PPG Industries.
 - E. CardVisteon Float Glass.
 - F. Approved Equal.
- 2.02 Glass:

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

- A. Insulated glass:
 - 1. Thickness:
1 inch thick insulating unit construction at new exterior hollow metal frames, doors, aluminum storefront, and aluminum entry doors.
 - 2. Air spacer to be continuous, one piece, tin plated steel "U" channel.
 - 3. Sealants:
Desiccated butyl to be extruded onto inside web of "U" channel, full perimeter.
 - 4. Exterior lite:
 - A. Thickness: 1/4 inch.
 - B. Tint: Clear.
 - C. Type: Fully tempered safety glass.
 - D. Thermal coating: The inside (#2) surface of the exterior lite to have a Low-E coating capable of providing the following minimum characteristics to the assembly:
 - 1. U-Value: 0.45.
 - 2. Solar Heat Gain Coefficient (SHGC): 0.25.
 - 3. Testing to be in accord with NFRC 100 environmental conditions.
 - 5. Interior lite:
 - A. Thickness: 1/4 inch.
 - B. Tint: Clear.
 - C. Type: Fully tempered safety glass.
- 2.03 Glazing Products:
 - A. General:
Select appropriate glazing sealants, tapes, gaskets and other glazing materials of proven compatibility with other materials that they contact. These include glass products, insulating glass unit seals and glazing channel substrates under installation and service conditions, as demonstrated by testing and field experience.
 - B. Setting Blocks: ASTM C864:
 - 1. Channel shape; having 6 mm (1/4 inch) internal depth.
 - 2. Shore a hardness of 80 to 90 Durometer.
 - 3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
 - 4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
 - 5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
 - C. Spacers: ASTM C864:
 - 1. Channel shape having a 6 mm (1/4 inch) internal depth.
 - 2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
 - 3. Lengths: One to 25 to 76 mm (one to three inches).
 - 4. Shore a hardness of 40 to 50 Durometer.
 - D. Sealing Tapes:
 - 1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
 - 2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
 - E. Spring Steel Spacer:
 - 1. Spring steel spacers may be used in rabbets of steel windows and hollow metal frames with stops.
 - 2. Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.
 - F. Glazing Sealants:
 - 1. ASTM C920, silicone neutral cure.
 - 2. Type S.
 - 3. Class 25
 - 4. Grade NS.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

5. Shore A hardness of 25 to 30 Durometer.

PART 3 - EXECUTION

- 3.01 Examination:
Site Verification and Conditions:
- A. Verify that site conditions are acceptable for installation of the glass.
 - B. Verify openings for glazing are correctly sized and within tolerance.
 - C. Verify that the minimum required face and edge clearances are being followed.
 - D. Do not proceed with glazing until unsatisfactory conditions have been corrected.
- 3.02 Preparation:
- A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.
 - B. Protection
Handle and store product according to manufacturers' recommendations.
 - C. Surface Preparation
 - 1. Clean and prepare glazing channels and other framing members to receive glass.
 - 2. Remove coatings and other harmful materials that will prevent glass and glazing installation required to comply with performance criteria specified.
 - 3. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.
 - 4. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
 - D. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
 - E. Verify that components used are compatible.
- 3.03 Installation:
- A. Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those in the "GANA Glazing Manual".
 - B. Install glass in prepared glazing channels and other framing members.
 - C. Exterior glazing in hollow metal frames:
 - 1. Cut glazing tape to length set against permanent stops. Seal corners by butting tape and sealing junctions with butyl sealant.
 - 2. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.
 - 3. Install setting blocks in rabbets as recommended by referenced glazing standards in GANA Glazing Manual and IGMA Glazing Guidelines with edge blocks no more than 150 mm (6 inches) from corners .
 - 4. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to achieve full contact at perimeter of pane or glass unit.
 - 5. Install removable stops with spacer strips inserted between glazing and applied stops, 6 mm (1/4 inch) below sight line. Place glazing tape on glazing pane or unit with tape flush with sight line.
 - 6. Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, but not more than 9 mm (3/8 inch) below sight line.
 - 7. Apply cap bead of sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
 - D. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
 - E. Provide bite on glass, minimum edge and face clearances and glazing material tolerances recommended by GANA Glazing Manual.
 - F. Set glass lites in each series with uniform pattern, draw, bow and similar characteristics.
 - G. Laminated Glass:
 - 1. Tape edges to seal interlayer and protect from glazing sealants.
 - 2. Do not use putty or glazing compounds.
 - H. Distribute the weight of the glass unit along the edge rather than at the corner.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

- I. Comply with manufacturer's and referenced industry recommendations on expansion joints and anchors, accommodating thermal movement, glass openings, use of setting blocks, edge, face and bite clearances, use of glass spacers, edge blocks and installation of weep systems.
 - J. Protect glass from edge damage during handling and installation.
 - K. Prevent glass from contact with contaminating substances that result from construction operations, such as weld spatter, fireproofing or plaster.
 - L. Remove and replace glass that is broken, chipped, cracked or damaged in any way.
- 3.04 Cleaning:
- A. Clean excess sealant or compound from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.
 - B. Glass to be cleaned according to:
 - 1. GANA Glass Informational Bulletin GANA 01-0300 - Proper Procedures for Cleaning Architectural Glass Products.
 - 2. GANA Glass Information Bulletin GANA TD-02-0402 - Heat-Treated Glass Surfaces Are Different.
 - C. Do not use scrapers or other metal tools to clean glass.

End of Section

DIVISION 09. FINISHES

SECTION 092900 GYPSUM DRY WALL

PART 1 - GENERAL

- 1.01 Work Included:
 - A. Gypsum board.
 - B. Casing beads.
 - C. Corner beads.
 - D. Drywall screws.
 - E. Joint treatments.
 - F. Repair of existing drywall ceiling at the enclosed vestibule.
- 1.02 Related Sections:
 - Cold Formed Metal Framing (SECTION 054000).
- 1.03 Shop Drawings:
 - A. As required by Section 013323.
 - B. Provide manufacturer's product literature for each product specified and used on the project.

PART 2 - PRODUCTS:

- 2.01 Gypsum board:
 - A. By United States Gypsum Company; Gold Bond; Georgia-Pacific; or approved equal.
 - B. 5/8 inch fire-rated gypsum board, tapered.
 - C. All applicable accessories to make a complete job.
- 2.02 Casing beads:
 - Galvanized wallboard casing "J" trim, sized for wallboard thickness.
- 2.03 Corner beads:
 - 1.1/4" x 1.1/4" galvanized corner reinforcement.
- 2.04 Drywall screws:
 - A. Corrosion-resistant.
 - B. 7/16" crown x length required to adequately penetrate substrate.
 - C. Conform to requirements of ASTM C 840.
- 2.05 Joint treatments:
 - A. Joint compound, perforated tape:
 - B. To comply with ASTM C 475.
 - C. Perforated or fiberglass tape.

PART 3 - EXECUTION

- 3.01 General:
 - This installation to be in complete conformance with all recommendations of the approved drywall manufacturer.
- 3.02 Gypsum board:
 - A. Install in accordance with manufacturer's written instructions and ASTM C 840 and GA 216.
 - B. Apply single layer gypsum board in most economical direction with ends and edges occurring over firm bearing.
 - C. Erect single layer fire rated gypsum board with edges and ends occurring over firm bearing.
 - D. Erect exterior gypsum sheathing horizontally, with edges butted and ends occurring over firm bearing.

DIVISION 09. FINISHES

SECTION 092900 GYPSUM DRY WALL (CONTINUED)

- E. Double Layer Applications: Use gypsum first layer, placed perpendicular or parallel to framing or furring members. Place second layer with offset joints from joints of first layer.
 - F. Place control joints consistent with lines of building spaces as indicated on drawings.
 - G. Locate joints at openings so no end joint will align with edges of opening.
 - H. Screw attach gypsum board horizontally. Gypsum board shall be attached to steel studs in accordance with ASTM Specification C-840, except that the steel drill screws used (Specification ASTM C-954) shall be spaced not more than 8 inches on center along edges and ends, and not more than 12 inches on center in the field of the board.
 - I. Stagger all joints, horizontally and vertically, on opposite faces of partition 16 inches minimum.
 - J. Where structural or mechanical systems penetrate wall system, tightly fill all voids and cracks with acoustical blanket material.
 - K. Place edges of boards in contact with each other but do not break surface.
 - L. Provide for deflection of load bearing members above non-loadbearing partitions.
 - M. Application of taping compound:
 - 1. Prefill openings wider than 1/4" (6.4 mm).
 - 2. Dimple fasteners slightly below surface of wall board, but do not break surface.
 - 3. All dimples and other depressions to be filled with joint compound.
 - 4. Application of taping compound:
 - A. Completely fill the recess formed by the tapered edges of the panel with taping compound.
 - B. Center joint tape and press into the taping compound by drawing the knife along the joint at a 45 degree angle.
 - C. Apply sufficient pressure to remove excess taping compound above, and at the edges of the joint tape.
 - D. Leave sufficient quantity of taping compound under the joint tape to ensure an adequate bond, but not more than 1.32" (0.8 mm) at the feathered edge.
 - E. As soon as joint tape has been embedded, apply a skim coat of taping compound over the joint tape and allow to dry completely.
 - 5. Apply corner beads at all external corners, apply coat of taping compound.
 - N. Apply casing beads at intersections of gypsum and masonry or concrete and other dissimilar surfaces where gypsum wall board terminates without trim to cover. Place corner beads at external corners. Use longest practical length.
 - O. Application of finishing compound:
 - 1. When taping compound has dried completely, apply additional coats of ready-mix finishing compound until finish level is achieved.
 - 2. Sand to smooth finish with 220 or 320 grit sand paper or screen cloth, smooth with a damp sponge.
- 3.03 Finishing:
General: Comply with ASTM C 840, GA 214 and GA 216 as applicable for the following use areas:
- A. Level 1:
Plenums, service corridors; above ceilings
 - B. Level 2:
Areas of water resistant gypsum backing board under tile; exposed areas where appearance is not critical.
 - C. Level 3:
Areas to receive heavy or medium textured coatings; heavy-grade wall coverings.

DIVISION 09 FINISHES

SECTION 092900 GYPSUM DRY WALL (CONTINUED)

- D. Level 4:
Areas to receive flat sheen paint finish; light textured coatings; lightweight wall coverings.
- E. Level 5:
Areas to receive gloss, semi-gloss sheen paints; critical lighting conditions (Typical finished areas).

End of Section

DIVISION 09 FINISHES

SECTION 095100 ACOUSTICAL CEILINGS

PART 1 - GENERAL

- 1.01 Work included:
 - A. Suspension system.
 - B. Acoustical ceiling tile.
 - C. For use where shown on the drawings in the areas of renovation and repair where necessary to install conduit and HVAC piping.
- 1.02 Samples:
Provide samples and product literature of tile and ceiling grid for approval.
- 1.03 Related sections:
Gypsum Dry Wall (SECTION 092900).

PART 2 - PRODUCTS

- 2.01 Exposed grid system:
 - A. As manufactured by Armstrong Ceiling Systems, or approved equal.
 - B. Main runners, cross runners, wall molding.
 - C. Materials:
 - 1. Exposed grid system:
 - 2. As manufactured by Chicago Metallic; Armstrong Ceiling Systems; Gordon Architectural Aluminum Specialities, Inc.; or approved equal.
 - 3. Main runners, cross runners, wall molding.
 - 4. Materials:
 - A. 15/16" baked enamel finish on steel, color to match existing grid.
 - B. Armstrong Prelude XL, or approved equal to match existing ceiling grid.
 - 5. Size to accommodate 24" x 24" lay-in panels.
- 2.02 Ceiling Tile:
 - A. For general repair:
 - 1. One of the following (or as required to match the existing ceiling tile):
 - A. Armstrong Minaboard Cortega, 24" x 24" x 5/8", #770.
 - B. Celotex Hytone Baroque, random fissured, 24" x 24" x 5/8", #BET-157.
 - C. USG Radar, 24" x 24" x 5/8", square edge.
 - D. Or approved equal.
 - 2. Class A Label per ASTM E 1264.
 - 3. Flame spread: 25 or under, U.L. Labeled.

PART 3 - EXECUTION

- 3.01 Installation by a factory approved applicator.
- 3.02 Install in compliance with manufacturer's printed instructions.
- 3.03 Install under normal operating temperature and humidity conditions.
- 3.04 Install systems to ceiling layout pattern as shown on drawings, or to permit border units of greatest possible size.
- 3.05 Check all members for horizontal and vertical alignment.
- 3.06 Cleaning:
 - 1. Clean soiled or discolored surfaces of units.
 - 2. Remove and replace damages or improperly installed units.
- 3.07 Leave one full package of tile on the job for the Owner.

DIVISION 09 FINISHES

SECTION 095100 ACOUSTICAL CEILINGS (CONTINUED)

End of Section

DIVISION 09. FINISHES

SECTION 096510 VINYL BASE

PART 1 - GENERAL

- 1.01 Work Included:
- A. Vinyl base as required at new work or to repair damaged base in the area of renovation.
 - B. Cleaning and polishing.
- 1.02 Referenced documents:
- A. ASTM International:
 - 1. F 1861 Standard Specification for Resilient Wall base
 - 2. E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
 - 3. F 386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces
 - 4. E 648 Standard Test Method for Critical Radiant Flux of Flooring systems Using a Radiant EnergySource.
 - 5. E 662 Test Method for Specific Density of Smoke Generated by Solid Materials.
 - 6. F 925 Standard Test Method for Resistance to Chemicals of Resilient Flooring.
 - 7. F 137 Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
 - 8. F 1515 Standard Test Method for Measuring Light Stability of Resilient Vinyl Flooring by Color Change.
 - B. Other Referenced Documents:
 - 1. National Fire Protection Association (NFPA): NFPA 255, Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source.
 - 2. National Fire Protection Association (NFPA) 258 Test Method for Specific Density of Smoke Generated by Solid Materials.
 - 3. California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).
 - 4. The Collaborative for High Performance Schools (CHPS)
- 1.03 Submittals:
- A. Product Data: Submit product data, including manufacturer's specification summary sheet for specified products.
 - B. Shop Drawings: Submit shop drawings showing layout, finish colors, patterns and textures.
 - C. Samples: Submit selection and verification samples for finishes, colors, and textures.
 - D. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
 - 2. Manufacturer's Instructions: Manufacturer's installation and maintenance instructions.
 - E. Submit the following:
 - 1. Maintenance Data: Maintenance data for installed products in accordance with Division 1 sections. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance.
 - 2. Warranty: Warranty documents specified herein.
- 1.04 Quality Assurance:
- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installing work similar to that required for this project.
 - B. Regulatory Requirements:

DIVISION 09. FINISHES

SECTION 096510 VINYL BASE (CONTINUED)

1. Fire Performance characteristics: Provide resilient sheet vinyl floor covering with the following fire performance characteristics as determined by testing products in accordance with ASTM method (and) NFPA method) indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - A. ASTM E 648 (NFPA 253), Critical Radiant Flux of Floor Covering Systems: Class 1, > 1.0 W/cm²
 - B. ASTM E 662 (NFPA 258), Specific Optical Density of Smoke Generated by Solid Materials: Passes, <450 c. ASTM E 84 (NFPA 255), Surface Building Characteristics of Building Materials: Class C.
 - C. Single-Source Responsibility: Obtain resilient wall base and manufacturer's recommended adhesive from a single supplier.
 - D. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate Conditions & manufacturer's recommended substrates and required preparation manufacturer's installation instructions and manufacturer's warranty requirements. Comply with requirements in Division 1.
- 1.05 Delivery, Storage, and Handling:
 - A. General: Comply with requirements in Division 1.
 - B. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
 - C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
 - D. Storage and Protection: Store materials protected from exposure to harmful weather conditions and acclimated to site conditions at temperature and humidity conditions recommended by manufacturer.
- 1.06 Project Conditions:
 - A. Environmental Requirements/Conditions:
In accordance with manufacturer's recommendations, areas to receive resilient wall base shall be clean, fully enclosed, weather tight with the permanent HVAC set at a uniform temperature of 65-85 degrees F for 48 hours prior too during, and thereafter installation of resilient wall base.
 - B. Resilient wall base and adhesive shall be conditioned in the same manner. Resilient wall base must be unboxed & acclimated in area of use at least 48 hours prior to installation. Minimum temperature shall be a 65 degrees F after installation.
- 1.07 Sequencing and Scheduling:
Finishing Operations: Install resilient wall base after finishing operations, including floor covering painting and ceiling operations etc., have been completed.
- 1.08 Warranty:
 - A. Manufacturer's Materials Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document.
 - B. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
 1. Warranty Period: 1 year limited warranty commencing on Date of Substantial Completion. Notice of any defect must be made in writing to manufacturer within thirty (30) days after buyer learns of the defect.
 2. Limited Wear Warranty: 3 year limited wear warranty.
- 1.09 Maintenance:
 - A. Extra Materials:

DIVISION 09. FINISHES

SECTION 096510 VINYL BASE (CONTINUED)

Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division One Closeout Submittals (Maintenance Materials) Section.

1. Quantity: Furnish quantity of Resilient Wall Base equal to 5% of amount installed.
 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.
- B. Maintenance of finished floor covering to be conducted per Manufacturer's Maintenance Guide.

PART 2 - PRODUCTS

- 2.01 Vinyl base:
- A. Johnsonite; Marley Flexco; Roppe Corporation; Armstrong Cork Company; or approved equal.
 - B. In compliance with ASTM F-1861 Type TV (Thermoplastic Vinyl).
 - C. 4 inch high vinyl cove base with standard toe.
 - D. Color to match existing vinyl base.
 - E. Ribbed back.
 - F. .125 (1/8) inch thickness.
 - G. Lengths: 120' coils.
 - H. Furnish matching premolded inside and outside corners with 2.1/4 inch returns.
- 2.02 Adhesives:
- A. Moisture resistant.
 - B. As recommended by tile manufacturer for installation on concrete slab.
- 2.03 Caulking:
- Colored caulk, as supplied by vinyl base manufacturer.

PART 3 - EXECUTION

- 3.01 Manufacturer's Instructions:
- A. Compliance: Comply with manufacturer's instructions for installation.
 - B. Commencement of work implies acceptance of surfaces.
- 3.02 Examination:
- A. Site Verification of Conditions:
Verify substrate conditions are acceptable for installing product in accordance with manufacturer's instructions.
 - B. Material Inspection: In accordance with manufacturer's installing requirements, visually inspect materials prior to installing. Material with visual defects shall not be installed.
- 3.03 Preparation:
- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation. B. Surface Preparation, General: Prepare substrate in accordance with manufacturer's instructions.
 - C. Substrate: Prepare manufacturer's recommended substrates to be smooth, rigid, flat, level, permanently dry, clean and free of foreign materials such as paint, dust, grease, oils, solvent, old adhesive residue, vinyl wall coverings, non-porous surfaces and all other contaminants that may interfere with adhesive bond.
- 3.04 Installing:
- A. Manufacturer's instructions for specifications on installing resilient wall base.
 - B. Resilient wall base colors, heights and profiles: As selected by Architect.

DIVISION 09. FINISHES

SECTION 096510 VINYL BASE (CONTINUED)

- 3.05 Field Quality Requirement:
- A. Manufacturer's Field Services: Upon Owner's request and with minimum 72 hours notice, provide manufacturer's field service consisting of product use recommendations and periodic site visits to confirm installing of product is in accordance with manufacturer's instructions.
- 3.06 Cleaning:
Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

End of Section

DIVISION 09. FINISHES

SECTION 096801 MODULAR CARPET TILE

PART 1 - GENERAL

- 1.01 Work Included:
- A. Modular carpet tile.
 - B. Backing.
 - C. Adhesive.
 - D. Installation.
 - E. Warranty.
- 1.02 Related sections:
Vinyl Base (Section 096510).
- 1.03 Samples and submittals:
- A. Provide full size samples of carpet tile for color selection and approval.
 - B. Furnish layout diagrams and installation instructions.
- 1.04 Modular Flooring Warranty:
- A. Materials must be new, of good material and workmanship, and shall be replaced promptly if any part or parts which by reason of defective material or workmanship shall fail under normal use, free of negligence or accident, for a minimum period of fifteen (15) years from date of installation acceptance. This warranty shall be non-prorated. Such replacement shall be free of any charge to the Owner.
 - B. The Contractor further warrants the installation of the carpet will be done according to carpet manufacturer's instructions and following best means available for a first class installation by reputable and competent installation professionals. The Contractor agrees to replace, re-install, and make any adjustments necessary to keep the installation to the user's satisfaction, and at no cost to the Owner, for a period of two (2) years from the date of the installation acceptance.

PART 2 - PRODUCTS

- 2.01 Carpeting:
- A. By Tandus Flooring, Shaw Industries Group, Inc., Bigelow Commercial Carpet, or approved equal.
 - B. Basis of design:
Tandus Centiva Assertive Action #04837, 24" x 24" carpet tile with ER3 modular backing.
 - C. Color to be selected from manufacturer's standard colors.
 - D. Construction: Symtex.
 - E. Construction Process: Tufted.
 - F. Aspect: Cut Loop.
 - G. Format Type: Tile.
 - H. Secondary Backing Density (ASTM D3574): 65 lb/ft³ (1.040 kg/m³).
 - I. Secondary Backing Thickness (ASTM D3574): 0.085" (2.20 mm).
 - J. Total Thickness: 0.285" (7.20 mm).
 - K. Face Weight: 29 oz./sq. yd.
 - L. Pile Height Average: 0.095 inch. (2.40 mm).
 - M. Fiber System: TDX Nylon.
 - N. Dye Method: 100% Solution Dyed.
 - O. Pattern Type: Texture.
 - P. Surface Treatment: Eco-Ensure.
 - Q. Primary Backing: Synthetic Non-Woven.
 - U. Intermediate Layer: Fiberglass Reinforced Sealant

DIVISION 09. FINISHES

SECTION 096801 MODULAR CARPET TILE (CONTINUED)

- 2.02 Product Testing/Information:
- A. Antimicrobial Chemicals: No anti-microbials (EPA Registered pesticides) added to product (ASTM E2471-05).
 - B. Electrostatic Propensity: 1.5 kV (AATCC 134); Permanent Conductive Fiber.
 - C. Surface Flammability: Passes CPSC FF 1-70 (ASTM D-2859).
 - D. Flooring Radiant Panel: Class 1 (mean average CRF: 0.45 w/sq cm or higher) (ASTM E-648).
 - E. Smoke Generation: Less than 450 (ASTM E-662).
 - F. Colorfastness to Light (AATCC 16E): >4 after 100 hours.
- 2.03 Installation Method: Glue-Down.
- 2.04 Cushion:
- A. Tandus ER3 Modular Cushion.
 - B. Total Product Recycled Content: 50.8%.
(Pre-Consumer: 40.8% Post Consumer: 10%).
 - C. Third Party Certification NSF-140: Platinum.
 - D. Product Size: 24" x 24" Tile.
 - E. Secondary Backing: 100% Recycled Content with Tru Bloc (Barrier System).
 - F. Intermediate Layer: Fiberglass Reinforced Sealant.
 - G. Product Construction: No Delamination per ASTM D-3936.
 - H. Secondary Backing Density: 65 lbs/cu ft (041 kg/cu m).
 - I. Secondary Backing Thickness: 0.087 inch (2.2 mm).
 - J. Total Weight: 134.9 oz/sq yd +/-5% (4574 g/sq m).
 - K. CRI Green Label Plus Certification: GLP1366.
- 2.05 Adhesives:
- A. As recommended by manufacturer and formulated for installation of carpet or accessories to applicable substrate.
 - B. Non-staining and moisture resistant.

PART 3 - EXECUTION

- 3.01 Delivery:
- A. Carpet shall not be delivered to the site until construction has progressed to the point of installing carpet, all wet work has dried, the building is totally enclosed and the heating and air conditioning system is under full control.
 - B. Carpet shall be delivered in the Manufacturer's original unopened packaging clearly marked as to the contents, size, and dye lot.
 - C. Materials shall be stored in a secure, safe area and protected against damage, deterioration, and contamination.
- 3.02 Preparation of Sub-Floors:
- A. Carpet installer to inspect all floors to receive carpeting and inform the Contractor of unsuitable sub-surfaces before commencing installation. Commencement of installation implies acceptance of sub-surface.
 - B. Floors shall be cleaned to remove dust, dirt, solvent, oil, grease, paint, plaster, and other substances which would be detrimental to the proper performance of the finished installation. Floors shall be allowed to dry thoroughly.
 - C. Immediately prior to the installation of carpet, all floor surfaces shall be thoroughly cleaned. The floor shall be wet mopped with warm water and allowed to dry thoroughly.

DIVISION 09. FINISHES

SECTION 096801 MODULAR CARPET TILE (CONTINUED)

- After mopping, the floor shall be vacuumed with a commercial vacuum cleaner.
- D. Concrete Substrates:
The Contractor shall verify to the Owner and installer a minimum of 30 days prior to the scheduled flooring installation the following substrate conditions. All substrate testing shall be documented and submitted to the Architect and Owner before commencement of the flooring installation.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- 3.03 Carpet Installation:
- A. Carpet installation shall not commence until painting and finishing work is complete and ceilings and overhead work is approved and completed.
 - B. Install cushion and carpeting to manufacturer's instructions for direct glue, wet spread installation.
 - C. In areas where carpeting does not cover entire room from wall to wall or at doorways where carpeting meets other types of flooring materials, provide vinyl edging (color by the Architect).
 - D. All Manufacturer's recommended tools, materials and equipment shall be used for installation. Manufacturer's printed instructions for direct glue installation procedures, including installation steps and finishing, shall be adhered to. Unsatisfactory installation resulting from work performed not in accordance with Manufacturer's recommendations may result in removal and re-laying of carpet at the expense of the Contractor.
 - E. All carpet shall be installed in accordance with the layout diagrams approved by the Architect.
 - F. The carpet tile must lay flat and be tension-free. Looseness shall be pulled or stretched out.
 - G. All carpet installed to be uniform in color and texture for each style chosen. No noticeable variance will be allowed between separate squares of the same carpet in the same area.
 - H. No raveled or highly visible seams will be allowed.
 - I. The carpet shall run under items such as heating convectors, demountable drywall partitions, etc., and shall be installed tight against columns, masonry walls, and cabinets so that all portions of the floor area are covered with carpet. All other obstructions which may occur shall be reported to the Architect prior to any work or fabrication.
 - J. Clean carpet upon completion of installation and provide protection until project completion. The type of non-staining cover material that should be used for the protective cover shall be recommended by the carpet manufacturer.
 - K. Provide the Owner with a quantity of carpet squares approximately equal to 2% of the installed area for future repair and replacement.
 - L. Upon completion of the installation, the Contractor shall remove all waste, excess materials, tools, and equipment.

End of Section

DIVISION 09. FINISHES

SECTION 099000 PAINTING

PART 1 - GENERAL

- 1.01 Work Included:
- A. New gypsum board.
 - B. Existing drywall ceiling in the enclosed vestibule.
 - C. Adjacent painted masonry materials or drywall surfaces damaged or marred during demolition.
 - D. Other exposed ferrous and galvanized metals related to this work.
- 1.02 Related Sections:
Caulking and Sealants (SECTION 079200).

PART 2 - PRODUCTS

- 2.01 Approved paint of the type required, manufactured by Benjamin Moore, or approved equal.
- 2.02 Prior to ordering materials submit list of materials and descriptions thereof for approval.
- 2.03 Deliver materials to building in original containers with labels intact and seals unbroken.
- 2.04 Pigments for tinting:
- A. For oil paints: color ground oil.
 - B. Enamels: colors ground in oil.
- 2.05 Shellac:
- A. White or orange, gum, cut in pure denatured alcohol.
 - B. Orange, limited to covering knots, resin sap.
- 2.06 Paint exterior:
- A. Provide primer produced by the same manufacturer as the finish coats.
 - B. Ferrous metals:
 - 1st coat: Red oxide metal primer, performance equivalent to TT-P-86, Type III (Duron "Dura Clad" damp proof red oxide metal primer, 33-350, or approved equal).
 - 2nd coat: Semi-gloss alkyd enamel, TT-E-529, Class A.
 - 3rd coat: Semi-gloss alkyd enamel, TT-E-529, Class A.First coat not required on items delivered shop primed.
 - C. Zinc-coated metal:
 - 1st coat: Zinc dust/zinc oxide primer TT-P-641.
 - 2nd coat: High gloss alkyd enamel, TT-E-489, Class A.
 - 3rd coat: High gloss alkyd enamel, TT-E-489, Class A.
- 2.07 Paint interior:
- A. Provide primer produced by the same manufacturer as the finish coats.
 - B. Provide following paint systems for various substrates, as indicated.
 - C. Concrete masonry units (for necessary touch-up if damaged or marred during installation of new door frames):
 - Semi-gloss enamel finish.
 - 1st coat: Interior latex emulsion, TT-P-29.
 - 2nd coat: Interior enamel undercoat, TT-E-543.
 - 3rd coat: Interior enamel semi-gloss, TT-E-509.Not less than 3.50 mils total dry thickness.
 - D. Ferrous metals:
 - Semi-gloss finish.
 - 1st coat: Red oxide metal primer, performance equivalent to TT-P-86, (Duron "Dura Clad" Damp Proof Red Oxide Metal Primer, 33-250, or approved equivalent).
 - 2nd coat: Enamel undercoater, TT-E-543.
 - 3rd coat: Semi-gloss enamel, TT-E-509.First coat not required on items that are shop primed or previously painted.
 - E. Galvanized metal:
 - Semi-gloss finish.
 - 1st coat: Zinc dust-zinc oxide primer, TT-P-641.
 - 2nd coat: Enamel undercoat, TT-E-543.
 - 3rd coat: Semi-gloss enamel, TT-E-509.Not less than 2.50 mils dry film thickness.

DIVISION 09. FINISHES

SECTION 099000 PAINTING (CONTINUED)

- F. Gypsum drywall:
Drywall and plaster in area of renovation.
Latex eggshell enamel (or as required to match existing surfaces).
 - 1st coat: Latex primer/sealer, TT-P-650D (may be omitted at previously painted surfaces).
 - 2nd coat: Interior latex enamel emulsion, TT-P-2119 (Class 2).
 - 3rd coat: Interior latex enamel emulsion, TT-P-2119 (Class 2).
- G. Adjacent surfaces:
Touch-up paint for adjacent surfaces to be the same type, color, and finish as original.

PART 3 - EXECUTION

- 3.01 Number of paint colors:
Approximately 3.
- 3.02 Store materials in space designated and protect space from damage.
 - A. Keep paints covered at all times, protect from freezing.
 - B. Safeguard against fire, provide metal containers for oil, cloth and waste.
- 3.03 Inspection of surfaces:
 - A. Before starting work have defects remedied. Commencing work implies acceptance of surfaces.
 - B. If dryness of surfaces is doubtful, use dampness indicating meter for test.
- 3.04 Painting:
 - A. Preparation of surfaces:
 - 1. Do not start painting and finishing until surfaces are suitable.
 - 2. Report unsuitable surfaces to the Architect before application of paint or finish.
 - 3. Remove all efflorescence, chalk, and dust from cementitious surfaces.
 - 4. Remove rust and scale from metal surfaces with wire brushing and sanding.
 - 5. Remove oil and grease from metal surfaces with turpentine or benzine.
 - 6. Remove dirt and mildew in accordance with the paint manufacturer's recommendations.
 - 7. Scrape and clean acoustical over spray from around perimeter of existing walls, approximately 1'-0" down from ceiling.
 - B. Determine alkalinity of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint.
 - C. Shop primed metals:
 - 1. Touch-up shop-applied and field-applied prime coats wherever damaged or bare and keep touched-up as necessary, before and after installation or erection of the items, to maintain protection of the metal from rust and corrosion.
 - 2. Clean and touch-up with the same type primer as initially used.
 - 3. Prime welds, new bolts, rivets and other fastening devices in metal work.
 - 4. Touch-up primed surfaces to be concealed in the construction prior to concealing.
 - D. Application:
 - 1. Quality work is recognized and will be demanded. Sloppy striking, holidays, inadequate coverage, etc., Will not be accepted.
 - 2. Spread materials evenly and flow on smoothly free from sags, runs, brush marks and corduroy, not less than manufacturer's recommended spreading rate to establish a total dry film thickness as specified, or if not specified, as recommended by the coating manufacturer.
 - 3. Allow undercoats to dry hard before application of subsequent coat.
 - 4. Mix and apply paints and finishes in accordance with manufacturer's detailed specifications or directions.
 - 5. Prime as soon as practical after delivery or placement of all uncoated work requiring painted finish. Retouch bare areas caused by working or handling.
 - 6. On surfaces of door frames, trim and metal work that will be concealed or inaccessible in the finished work, apply one coat of paint after the work is fitted but before it is placed.
 - 7. Provide adequate protection to prevent paint being splashed or dropped on adjacent surfaces or different finish.
 - 8. Mechanical and electrical work: Painting of mechanical / electrical work is limited to those items exposed in the finished areas.
 - 9. Paint interior surfaces of ducts, where visible through registers or grilles, with a

DIVISION 09. FINISHES

SECTION 099000 PAINTING (CONTINUED)

- flat, non-specular black paint.
- 3.05 Protection:
- A. Loosen canopies of lighting fixtures, cover while painting, replace upon completion.
 - B. Remove electric plates, surface hardware; protect and replace upon completion.
 - C. Mask off all convenience outlets after removing cover plates before painting.
 - D. Mask all areas to be left unfinished that are adjacent to painted surfaces.

End of Section

SECTION 230500

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL SUMMARY

1.1

- A. Section Includes:
 - 1. Basic mechanical methods.
 - 2. Supports and anchors.
 - 3. Motors.
 - 4. Mechanical identification.
 - 5. Vibration isolation.
 - 6. Sleeves and seals.

- B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.

- C. Related Sections:
 - 1. 078400 - Firestopping: Materials for closure of penetrations at rated assemblies.
 - 2. 079200 - Joint Sealants: Sealants.
 - 3. 099100 - Painting: Field painting.
 - 4. 019113 General Commissioning Requirements: Requirements related to Division 23 Commissioning

5. REFERENCES

1.2

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

 - B. American Society of Mechanical Engineers (ASME):
 - 1. ASME A13.1 - Scheme for the Identification of Piping Systems.
 - 2. ASME B31.5 - Refrigeration Piping
 - 3. ASME B31.9 - Building Services Piping

 - C. National Fire Protection Association
 - 1. NFPA 13 - Installation of Sprinkler Systems.

 - D. Institute of Electrical and Electronic Engineers
 - 1. IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.

 - E. National Electrical Manufacturers Association
 - 1. NEMA MG 1 - Motors and Generators.
- SUBMITTALS

1.3

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:

- a. Pipe Supports and Anchors: Provide manufacturers catalog data including load capacity.
 - b. Motors: Provide wiring diagrams with electrical characteristics and connection requirements.
 - c. Mechanical Identification: Provide manufacturers catalog literature for each product required.
- B. Section 017704 – Closeout Procedures and Training: Procedures for closeout submittals.
- 1. Project Record Documents: Accurately record the following:
 - a. Record actual locations of tagged valves; include valve tag numbers.

QUALITY ASSURANCE

1.4

Regulatory Requirements:

- A.
 - 1. Conform to applicable local code for support of plumbing piping.
 - 2. Supports for Fire Suppression Piping: In conformance with NFPA 13.
 - 3. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.

DELIVERY, STORAGE, AND HANDLING

1.5

- A.
- B. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- C. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering.

BASIC MECHANICAL METHODS

1.6

- A. Comply with manufacturer's published instructions for delivery, storage, protection, installation, and materials.
- B. When equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall properly clean the equipment, install new filter media, make all required adjustments, and complete all punch list items before final acceptance by the Construction Manager and Contracting Officer.
- C. Install equipment and materials to provide required access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of required access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- D. Where mounting heights are not detailed or dimensioned, install mechanical services and overhead equipment to provide the maximum headroom possible.
- E. Items exposed (in areas without ceilings) shall be installed in a neat, orderly manner. Elements shall be perpendicular and parallel to building lines.

- F. In those conditions where ductwork is exposed in finished areas, careful craftsmanship and only the highest standards of installation will be acceptable. All routing of exposed ducts, pipes, conduits, shall be approved in advance by the Contracting Officer prior to installation.
- G. Drawings And Specifications:
1. The Drawings indicate the general arrangement of systems and are to be followed insofar as possible. If deviations from the layout are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Contracting Officer , for approval before proceeding with the work.
 2. This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. Contractor shall coordinate this work with all other branches in such a manner as to cause a minimum of conflict or delay.
 3. Where any work is so placed as to cause or contribute to a conflict it shall be readjusted at the expense of the Contractor causing the conflict. The decision shall be final in regard to the arrangement of ducts, piping, etc., where conflict arises.
 4. Where offsets in systems are required to complete the installation, or for the proper operation of the system, these shall be deemed to be included in the Contract.
 5. Significant deviations from Drawings must be approved by the.
- H. Locations:
1. Mechanical layouts indicated on drawings are diagrammatic. Exact locations of ducts, pipes, and equipment may vary because of conflicts with work of other trades. Work out conflicts where relocations will not affect operation or appearance of systems.
 2. Locate equipment requiring periodic servicing so that it is readily accessible. Do not back up service sides to walls, nor place it too close to other equipment to make service impractical.

PART 2 - PRODUCTS
PIPE HANGERS AND SUPPORTS

2.1

- A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
1. Grinnell, Exeter, NH (603) 778-9200.
 2. Other acceptable manufacturers offering equivalent products.
 - a. Elcen
 - b. Fee and Mason
 - c. Kin-Line
 - d. Michigan
 - e. Unistrut
 3. Section 016000 - Product Requirements: Product options and substitutions. Substitutions: Permitted.
- B. Refrigerant Piping:
1. Conform to [ASTM F708](#).
 2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): [Carbon steel](#), adjustable swivel, split ring.
 3. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
 4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 5. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
 6. Wall Support for Pipe Sizes 4 Inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.
 7. Vertical Support: Steel riser clamp.
 8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

C. See Hanger and Support schedule at end of this Section.

MECHANICAL IDENTIFICATION

2.2

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

B. Tags

1. Plastic Tags: Laminated three-layer plastic with engraved **black** letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) **diameter**.
2. Metal Tags: **Brass** with stamped letters; tag size minimum 1-1/2 inches (38 mm) **diameter** with smooth edges.
3. Information Tags: Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (83 x 143 mm) with grommet and self-locking nylon ties.
4. Tag Chart: Typewritten letter size list **in anodized aluminum frame**.

C. Pipe Markers

1. Color and Lettering: Conform to ASME A13.1.
2. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
3. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
4. Plastic Underground Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.

VIBRATION ISOLATION

2.3

A. Type 1: Closed spring mount with top and bottom housing separated with neoprene rubber stabilizers.

B. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).

C. Type 3: Open spring mount with stiff springs, heavy mounting frame, and limit stop.

D. Type 4: Closed spring mount with stiff springs and limit stop.

E. Type 5: Closed spring hanger with acoustic washer.

F. Type 6: Closed spring hanger with one inch (25 mm) thick acoustic isolator.

G. Type 7: Elastomer mount with threaded insert and hold down holes.

H. Type 8: Neoprene jacketed pre-compressed molded glass fiber.

I. Type 9: Rubber waffle pads, 30 durometer, minimum 1/2 inch (13 mm) thick, maximum loading 40 psi (275 kPa). Use neoprene in oily or exterior locations.

J. Type 10: 1/2 inch (13 mm) thick rubber waffle pads bonded each side of 1/4 inch (6 mm) thick steel plate.

SLEEVES AND SEALS

2.4

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage (1.2 mm thick) galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage (1.2 mm thick) galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed, refer to Section 078400.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.
- F. Firestopping Insulation: Glass fiber type, non-combustible; refer to Section 078400.
- G. Sealant: refer to Section 079200.

PART 3 - EXECUTION EXAMINATION

3.1

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
- C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.

PREPARATION - MECHANICAL IDENTIFICATION

3.2

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

INSTALLATION - GENERAL

3.3

- A. Install in accordance with manufacturer's instructions.
- B. The use of lead-containing solder for plumbing and plumbing fixtures is prohibited in the construction of this project.

INSTALLATION - PIPE HANGER AND SUPPORTS

3.4

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.

- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
 - D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
 - E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet (1.5 m) maximum spacing between hangers.
 - F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
 - G. Support riser piping independently of connected horizontal piping.
 - H. Provide [copper plated hangers and supports for copper piping](#).
 - I. Design hangers for pipe movement without disengagement of supported pipe.
 - J. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- INSTALLATION - MOTORS

3.5

- A. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
 - B. Line up motors on direct drive dial type gauges.
 - C. Check line voltage and phase and ensure agreement with nameplate.
 - D. Make electrical connections and test motor for proper rotation/ phasing under Division 26.
 - E. Adjust motors together with driven equipment to insure equipment is dynamically and statically balanced. Correct any excessive vibration or noise from the equipment.
- INSTALLATION - MECHANICAL IDENTIFICATION

3.6

- A. Install identifying devices after completion of coverings and painting.
- B. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive.
- C. Install tags using corrosion resistant chain. Number tags consecutively by location.
- D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
- E. 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 tags.
- F. Identify control panels and major control components outside panels with plastic nameplates.
- G. Identify valves in main and branch piping with tags.
- H. Identify air terminal units and radiator valves with numbered tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.

- J. Identify piping, concealed or exposed, with plastic pipe markers and plastic tape pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Identify ductwork with plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- L. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

INSTALLATION - VIBRATION ISOLATION

3.7

- A. Install vibration isolators for motor driven equipment.
- B. Set steel bases for one inch (25 mm) clearance between housekeeping pad and base. Set concrete inertia bases for 2 inch (50 mm) clearance. Adjust equipment level.
- C. Provide spring isolators on piping connected to isolated equipment as follows: Up to 4 inch (100 mm) diameter, first three points of support; 5 to 8 inch (125 to 200 mm) diameter, first four points of support; 10 inch (250 mm) diameter and over, first six points of support. Static deflection of first point shall be twice deflection of isolated equipment.

PIPE HANGER AND SUPPORT SCHEDULE

3.8

HANGER ROD

A.			
1.	PIPE SIZE	MAX. HANGER SPACING	
DIAMETER			
2.	Inches (mm)	Feet (m)	Inches (mm)
3.	1/2 to 1-1/4	6.5 (2)	3/8 (9)
4.	(12 to 32)		
5.	1-1/2 to 2	10 (3)	3/8 (9)
6.	(38 to 50)		
7.	2-1/2 to 3	10 (3)	1/2 (13)
8.	(62 to 75)		
9.	4 to 6	10 (3)	5/8 (15)
10.	(100 to 150)		
11.	8 to 12	14 (4.25)	7/8 (22)
12.	(200 to 300)		
13.	PVC (All Sizes)	6 (1.8)	3/8 (9)
14.	C.I. Bell and		
15.	Spigot(or No-Hub)	5 (1.5)	1/2 (13)

16.

and at Joints

B.END OF SECTION

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Date: 10/1/2016

COMMON WORK RESULTS
FOR HVAC

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SECTION 230719
PIPING INSULATION

PART 1 - GENERAL
SUMMARY

1.1

- A. Section Includes:
 - 1. Piping insulation.
 - B.
 - C. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
- REFERENCES

1.2

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
 - 2. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 3. ASTM C534 - Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.
 - 4. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.
 - 5. ASTM E84 - Surface Burning Characteristics of Building Materials.
 - 6. ASTM E96 - Water Vapor Transmission of Materials.
 - B. National Fire Protection Association (NFPA):
 - 1. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
 - C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
 - D. Underwriters Laboratories, Inc. (UL):
 - 1. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
- SUBMITTALS

1.3

- A. Section 013300 - Submittal Procedures: Procedures for submittals.
 - 1. Product Data:
 - a. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- QUALITY ASSURANCE

1.4

- A. Qualifications:
 - 1. Manufacturer: Company specializing in manufacturing Products specified with minimum 3 years documented experience.
 - 2. Installer: Company specializing in performing the Work of this Section with minimum 3 years documented experience.

- B. Materials:
 - 1. Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84, NFPA 255 and UL 723.
 - 2. Insulation for duct, pipe and equipment for above grade exposed to weather outside building shall be certified as being self-extinguishing for 1 inch thickness less than 53 seconds when tested in accordance with ASTM D1692.

DELIVERY, STORAGE, AND HANDLING

1.5

- A. Section 016000 - Product Requirements: Transport, handle, store, and protect Products.
- B. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Store insulation in original wrapping and protect from weather and construction traffic.
- D. Protect insulation against dirt, water, chemical, and mechanical damage.

PROJECT CONDITIONS OR SITE CONDITIONS

1.6

- A. Jobsite Requirements
 - 1. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
 - 2. Maintain temperature during and after installation for minimum period of 24 hours.

ENVIRONMENTAL REQUIREMENTS

1.7

- A. Energy efficiency:
 - 1. Insulation: Minimum thickness in accordance with ASHRAE 90.1. Provide additional thickness to ensure surface temperatures are below 100 degrees and to prevent condensation on cold surfaces.

PART 2 - PRODUCTS
PIPING INSULATION

2.1

- A. Cellular Foam
 - 1. Manufacturers:
 - a. Armstrong World Industries, Inc, Lancaster, PA (800) 448-1405.
 - b. Other acceptable manufacturers offering equivalent products.
 - 1) Halstead Industries, Inc.
 - 2) Rubatex Corporation, Armaflex II.
 - 2. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
 - a. 'K' ('ksi') Value: ASTM C177 or C518; 0.27 at 75 degrees F,
 - b. Minimum Service Temperature: -40 degrees F.
 - c. Maximum Service Temperature: 220 degrees F.
 - d. Maximum Moisture Absorption: ASTM D1056; 1.0 percent (pipe) by volume, 1.0 percent (sheet) by volume.

- e. Moisture Vapor Transmission: ASTM E96; 0.20 perm inches.
 - f. Maximum Flame Spread: ASTM E84; 25.
 - g. Maximum Smoke Developed: ASTM E84; 50.
 - h. Connection: Waterproof vapor barrier adhesive.
3. Elastomeric Foam Adhesive
- a. Manufacturers:
 - 1) Dow U.S.A.
 - 2) H. B. Fuller Co.
 - 3) Rubatex Corporation.

PART 3 - EXECUTION

EXAMINATION

3.1

- A. Section 017300 - Execution: Verification of existing conditions before starting work.
 - B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
 - 1. Verify that piping has been tested before applying insulation materials.
 - 2. Verify that ductwork has been tested before applying insulation materials.
 - 3. Verify that surfaces are clean, foreign material removed, and dry.
 - C. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
 - D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the United States Postal Service.
- INSTALLATION - PIPING INSULATION

3.2

- A. Install materials in accordance with manufacturer's instructions and ASHRAE 90.1.
- B. On exposed piping, locate insulation and cover seams in least visible locations.
- C. Insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature:
 - 1. Provide vapor barrier jackets, factory applied or field applied.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe.
 - 3. PVC fitting covers may be used.
 - 4. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
 - 5. Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- D. For insulated pipes conveying fluids above ambient temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory applied or field applied.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe.
 - 3. Finish with glass cloth and adhesive.
 - 4. PVC fitting covers may be used.
 - 5. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
 - 6. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.

- E. Inserts and Shields:
 1. Application: Piping 3 inches diameter or larger.
 2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
 3. Insert Location: Between support shield and piping and under the finish jacket.
 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- F. Finish insulation at supports, protrusions, and interruptions.
- G. For buried piping, use elastomeric foam insulation only.

CONSTRUCTION

3.3

- A. Substituted insulation materials shall provide thermal resistance within 10 percent at normal conditions, as materials indicated.

PIPING INSULATION SCHEDULE

3.4

- A. Cellular Foam Insulation Schedule

1. PIPING SYSTEMS	PIPE SIZE	THICKNESS
2.	Inch	Inch
a. HVAC Refrigerant Lines (suction only)	All	3/4"
3.		

B.END OF SECTION

SECTION 232300

REFRIGERANT PIPING

SUBMITTALS:

1.1

- A. Product Data: Include pressure drop, based on manufacturer's test data, for thermostatic expansion valves, solenoid valves, and pressure-regulating valves.
- B. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.
 - 1. Size piping and design the actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes, to ensure proper operation and compliance with warranties of connected equipment.
 - 2.

QUALITY ASSURANCE:

1.2

- A. ASHRAE Standard: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. ASME Standard: Comply with ASME B31.5, "Refrigeration Piping."
- C. UL Standard: Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

PART 2 - PRODUCTS

COPPER TUBE AND FITTINGS:

2.1

- A. Drawn-Temper Copper Tube: ASTM B 280, Type ACR.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Wrought-Copper Unions: ASME B16.22.
- D. Bronze Filler Metals: AWS A5.8, Classification BAg-1 (silver)

REFRIGERANT PIPING SPECIALITIES:

2.2

- A. Replaceable-Core Filter-Dryers: 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
1. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.
 2. Service Valves: 500-psig (3450-kPa) pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.
 3. Pressure-Regulating Valves: Comply with ARI 770; direct acting, brass; with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connection; suitable for refrigerant specified.
 4. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.
 5. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer of evaporator, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.
 6. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.
 7. Moisture/Liquid Indicators: 500-psig (3450-kPa) maximum working pressure and 200 deg F (93 deg C) operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.

PART 3 - EXECUTION

PIPING APPLICATIONS:

3.1

- A. Aboveground, within Building: Type ACR drawn-copper tubing or Type L (Type B) drawn-copper tubing.
- B. Belowground for NPS 2 (DN 50) and Smaller: Type K (Type A) annealed-copper tubing.

PIPING INSTALLATION:

3.2

- A. Install refrigerant piping according to ASHRAE 15. Equipment manufacturer shall size refrigerant lines for Contractor.
- B. Basic piping installation requirements are specified in Division 23 Section "Common Work for HVAC."
- C. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- D. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- E. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

- F. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be exposed to mechanical injury.
- G. Slope refrigerant piping as follows:
1. Install horizontal suction lines with a uniform slope downward to compressor.
 2. Install traps and double risers to entrain oil in vertical runs.
 3. Liquid lines may be installed level.
- H. Hanger, support, and anchor products are specified in Division 23 Section "Hangers and Supports."
- H. Install the following pipe attachments:
- I. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
1. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
- J.
1. NPS 1/2: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 2. NPS 5/8: Maximum span, 60 inches; minimum rod size, 1/4 inch.
 3. NPS 1: Maximum span, 72 inches; minimum rod size, 1/4 inch.
 4. NPS 1-1/4: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 5. NPS 1-1/2: Maximum span, 96 inches; minimum rod size, 3/8 inch.
- Support vertical runs at each floor.
- K. Pipe Joint Construction:
- L.
1. Braze joints according to Division 23 Section "Common Work for HVAC."
 2. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.
- M. Refrigerant Pipe Insulation:
- M. Insulate refrigerant piping according to Division 23 Section "Pipe Insulation."
1. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
- N.
1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
 2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
 - a. System shall maintain test pressure at the manifold gage throughout duration of test.
 - b. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
 - c. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.
- O. Adjust set-point temperature of the conditioned air controllers to the system design temperature.
- O. Before installing copper tubing other than Type ACR, clean tubing and fittings with trichloroethylene.
- P. Replace core of filter-dryer after system has been adjusted and design flow rates and pressures are established.
- Q. Charge system using the following procedures:
- R.

- Install core in filter-dryer after leak test but before evacuation.
- 1.
 2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
 4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

SECTION(S) 260000 – INDEX OF SPECIFICATIONS

DIVISION 26 – ELECTRICAL

- 260500 - COMMON WORK RESULTS FOR ELECTRICAL
- 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
- 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
- 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
- 262726 - WIRING DEVICES
- 265100 - INTERIOR LIGHTING

END OF SECTION(S)

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Grout.
4. Common electrical installation requirements.
5. Division of work.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.

1.4 SUBMITTALS

- A. Product Data: Not required.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Panels and Frames."

- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. EMT: Ans I C80.1.

2.2 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.
- F. Listing and Labeling:
 - 1. Provide material and equipment with electrical components that are Listed and Labeled. The terms "Listed" and "Labeled" shall be as defined in the National Electrical Code, Article 100. Listing and Labeling of Equipment shall be by third party agencies accredited to label electrical and mechanical equipment.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless noted otherwise.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Extend sleeves installed in floors 6 inches above finished floor level. Extend sleeves installed in walls 2" on either side of penetration. Provide plastic bushing on ends of all pipe sleeves.
- F. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- G. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- H. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- I. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- J. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.5 DIVISION OF WORK

- A. This section delineates the division of work between Division 23 and Division 26.
- B. Specific work to be done under Division 26 is hereinafter listed or described. All other work necessary for the operation of Division 23 equipment shall be performed under Division 23.
- C. All individual motor starters and drives for mechanical equipment (fans, pumps, etc.) shall be furnished and installed under Division 23 unless indicated as a part of a motor control center. Motor starters for mechanical equipment provided in motor control centers shall be furnished under Division 26.
- D. Under Division 26, power wiring shall be provided up to a termination point consisting of a junction box, trough, starter, VFD or disconnect switch. Under Division 26 line side terminations shall be provided. Wiring from the termination point to the mechanical equipment, including final connections, shall be provided under Division 23.
- E. Duct smoke detectors shall be furnished and wired by Division 26, installed by Division 23. Fire alarm AHU shut down circuits shall be wired from the fire alarm control panel to a termination point, adjacent to the AHU control, under Division 26. AHU control wiring from the termination point to the equipment shall be under Division 23.
- F. Equipment less than 110 Volt, all relays, actuators, timers, seven-day clocks, alternators, pressure, vacuum, float, flow, pneumatic-electric, and electri-pneumatic switches, aquastats, freezestats, line and low voltage thermostats, thermals, remote selector switches, remote push-button stations, emergency break-glass stations, interlocking, disconnect switches beyond termination point, and other appurtenances associated with equipment under Division 23 shall be furnished, installed and wired under Division 23.
- G. All wiring required for controls and instrumentation not indicated on the drawings shall be furnished and installed by Division 23.
- H. Roof exhaust fans with built-in disconnects provided under Division 23 shall be wired under Division 26 to the line side of the disconnect switch. A disconnect switch shall be provided under Division 26 if the fan is not provided with a built-in disconnect switch. In this case, wiring from the switch to the fan shall be under Division 23.
- I. The sequence of control for all equipment shall be as indicated on the Division 23 Drawings and specified in Division 23 "Instrumentation and Control for HVAC".
- J. Horsepower for all motors shall be indicated on the Division 23 and Division 26 Drawings.
- K. All sprinkler flow and tamper switches shall be furnished and installed under Division 23 and wired under Division 26.

- L. Where electrical wiring is required by trades other than covered by Division 26, specifications for that section shall refer to same wiring materials and methods as specified under Division 26. No Exceptions.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

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

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alcan Products Corporation; Alcan Cable Division.
 - 2. American Insulated Wire Corp.; a Leviton Company.
 - 3. General Cable Corporation.
 - 4. Senator Wire & Cable Company.
 - 5. Southwire Company.
- B. Copper Conductors: Comply with NEMA WC 70. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch (1.3- or 3.5-mm) thickness as indicated and of length to suit application.
- C. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.4 SLEEVE SEALS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Carbon steel. Include two for each sealing element.

3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper Unless Otherwise noted on the electrical drawings. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. MC or AC cable is not allowed.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- B. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- C. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."
- G. Circuits may not share neutral conductors.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve rectangle perimeter less than 50 inches (1270 mm) and no side greater than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - 2. For sleeve rectangle perimeter equal to, or greater than, 50 inches (1270 mm) and 1 or more sides equal to, or greater than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both wall surfaces.
- G. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and cable unless sleeve seal is to be installed.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."
- L. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.

- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Stranded Conductors: ASTM B 8.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.

- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer.
 - 1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

- E. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. RMC: Rigid metal conduit.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.

- d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4. For use at building exterior and main electrical room.
 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4. For interior use (except main electrical room).
 4. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- D. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC.
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries.
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC.
 3. Hanger Rods: Threaded steel.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To New Concrete: Bolt to concrete inserts.
 - 2. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 PAINTING

- A. Touchup: Comply with requirements in Division 09 for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring and telecommunications rough-ins.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.
- C. IMC: Intermediate metal conduit.
- D. RMC: Rigid metallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
- C. Access Panel Drawings: For all NEC required access panels in gyp or "hard" ceilings, provide a drawing showing location and size of all proposed access panels. Drawing must be approved by Architect prior to routing any conduit.

1.5 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AFC Cable Systems, Inc.
 2. Alflex Inc.
 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 5. Electri-Flex Co.
 6. Manhattan/CDT/Cole-Flex.
 7. Maverick Tube Corporation.
 8. O-Z Gedney; a unit of General Signal.
 9. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. EMT: ANSI C80.3.
- D. FMC: Zinc-coated steel.
- E. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
1. Fittings for EMT 2" and smaller: Steel, compression type.
 2. Fittings for EMT 2-1/2" and larger: Steel, set-screw type.
- F. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 METAL WIREWAYS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cooper B-Line, Inc.
 2. Hoffman.
 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type [1], unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: As indicated
- E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 2. EGS/Appleton Electric.
 3. Erickson Electrical Equipment Company.
 4. Hoffman.
 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 6. O-Z/Gedney; a unit of General Signal.
 7. RACO; a Hubbell Company.
 8. Robroy Industries, Inc.; Enclosure Division.
 9. Scott Fetzer Co.; Adalet Division.
 10. Spring City Electrical Manufacturing Company.
 11. Thomas & Betts Corporation.
 12. Walker Systems, Inc.; Wiremold Company (The).
 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

2.4 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: Rigid steel conduit.
 2. Concealed Conduit, Aboveground: Rigid steel conduit.
 3. Underground Conduit: RNC, Type EPC-80, direct buried.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Concealed in Ceilings and Interior Walls and Partitions: EMT.

3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 4. Damp or Wet Locations: Rigid steel conduit.
 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-in (21-mm) trade size Indoors, 3/4-inch (21-mm) trade size Outdoors.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. 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.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- H. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- I. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- J. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- K. Flexible Conduit Connections: Use maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.

- L. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- M. In areas with gyp ("hard") ceilings – provide all required access panels per NEC requirements. Contractor shall minimize number of access panels and shall submit location plan (as detailed in part 1.4 of this section) prior to routing any conduit.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway unless sleeve seal is to be installed.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- I. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."

3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.5 PROTECTION

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

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for conductors.
 - 2. Warning labels and signs.
 - 3. Equipment identification labels.
 - 4. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

2.2 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.3 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.4 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black except where used for color-coding.

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.
- I. Provide conductor color coding legend per NEC 210.5 and 215.12.
- J. Label all junction box coverplates with circuit number and panel designation of all circuits contained within the box.
- K. Label all receptacle and switch cover plates with source panel designation and circuit number.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V, 3-Phase Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 240/120-V, 1-Phase Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.

- c. Colors for 480/277-V, 3-Phase Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
- 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- C. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- D. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.
- E. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
- 1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 - 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.

- c. Access doors and panels for concealed electrical items.
 - d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - e. Enclosed switches (including equipment safety switches).
 - f. Contactors.
 - g. Junction boxes
 - h. Receptacle and switch coverplates.
3. Nameplate material Colors:
- a. Blue surface with white core for 120/208 or 120/240 volt equipment.
 - b. Black surface with white core for 277/480 volt equipment.
 - c. Bright red surface with white core for all equipment related to fire alarm system.
 - d. Dark red (burgundy) surface with white core for all equipment related to Security.
 - e. Green surface with white core for all equipment related to "emergency" systems.
 - f. Orange surface with white core for all equipment related to telephone systems.
 - g. Brown surface with white core for all equipment related to data systems.
 - h. White surface with black core for all equipment related to paging systems.
 - i. Purple surface with white core for all equipment related to TV systems.

END OF SECTION 260553

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist locking receptacles.
 - 3. Snap switches and wall-box dimmers.

1.3 DEFINITIONS

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following (manufacturers apply to other Part 2 articles in this section):
1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 3. Leviton Mfg. Company Inc. (Leviton).
 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).
 5. WattStopper

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498. Receptacles shall have side wired terminals with brass screws and hex head grounding screw.
1. Available Products: Provide straight blade receptacles by manufacturers indicated in section 2.1.

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped. Receptacles shall have side wired terminals with brass screws and hex head grounding screw.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
1. Available Products: Provide GFCI receptacles by manufacturers indicated in section 2.1.

2.4 TWIST-LOCKING RECEPTACLES

- A. Provide receptacles with NEMA configuration as specified on the drawings.
1. Available Products: Provide snap switches by manufacturers indicated in section 2.1.

2.5 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20. Switches shall have side wired terminals with brass screws and hex head grounding screw.
- B. Switches, 120/277 V, 20 A:
1. Available Products: Provide snap switches by manufacturers indicated in section 2.1.

2.6 WALL PLATES

- A. Single and combination types to match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Finished Spaces: Type 302 stainless steel.
 - 3. Material for Unfinished Spaces: Galvanized steel.

2.7 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - 1. Wiring Devices: Gray, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- D. Device Installation:
 - 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
 - 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 - 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 - 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.

8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 262726

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures, lamps, and ballasts.
 - 2. Lighting fixture supports.

1.3 DEFINITIONS

- A. BF: Ballast factor.
- B. CCT: Correlated color temperature.
- C. CRI: Color-rendering index.
- D. Lumen: Measured output of lamp and luminaire, or both.
- E. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Ballast, including BF.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - 5. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Comply with NFPA 70.

1.6 COORDINATION

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

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Plastic Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. Ballasts: One for every 100 of each type and rating installed. Furnish at least one of each type.
 - 5. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated on Drawings.

2.2 FLUORESCENT LAMP BALLASTS

- A. Provide electronic ballasts for fluorescent lamps. Ballasts shall be UL listed, Class P, Sound Rated A, and shall meet or exceed ANSI C82.11 requirements. Ballasts shall be multi-volt and shall have a high power factor (minimum of 90%). Lamp current crest factor shall be less than or equal to 1.7. Input current third harmonics shall not exceed ANSI recommendations (32% total harmonic distortion, 27.5% of the third triplets). Flicker shall be 15% or less with any lamp suitable for the ballast. Ballast design shall withstand line transients per IEEE 587, Category A and shall meet FCC Rules and Regulations, part 18. Ballast case temperature shall not exceed 25 degrees C rise over 40 degrees C ambient. Ballasts shall be parallel wired. The ballast shall have an end-of-life detection and shutdown circuit.
- B. Ballasts for dimmer-controlled fixtures shall comply with general and fixture-related requirements above for electronic ballasts. Ballasts shall be compatible with lamps and with dimming controls. Dimming range shall be 1 to 100% for T8 and T5 lamps, and 5 to 100% for compact fluorescent

lamps, unless noted otherwise.

- C. Ballasts for low-temperature environments shall be rated for 0 degrees F or minus 18 degrees C starting temperature.
- D. Ballasts for double-ended fluorescent lamps shall be provided with a disconnecting means located next to the room's local switch and in sight of the lighting fixture, unless installed as part of the lighting fixture. Disconnect shall be labeled.

2.3 LED DRIVERS

- A. LED drivers shall be UL 1310 and UL 879A Class 2 compliant. Drivers shall be electronic low-voltage, ELV, "trailing-edge" dimmable, unless noted otherwise. Drivers shall use convection cooling and shall have an operating temperature range of -40 to 55 degrees C. Drivers shall be listed for the environment in which they are located.
- B. Driver mean time between failures shall be greater than 100,000 hours at full load and 25 degrees C ambient. EMC shall be compliant to 47CFR, Part2, Part15 and Cisp PUB, 22 Class B. Acoustic noise shall be less than 24dB (20-20k Hz). Power factor shall be greater than 0.97% at full load. Leakage current shall not exceed 300uA.
- C. Drivers shall have over-voltage, over-current, and short-circuit protection with auto recovery.

2.4 LAMPS

- A. Provide low-mercury lamps for fluorescent and HID lamps. Comply with Federal toxicity characteristic leaching procedure test.
- B. Provide incandescent lamps rated at 130 volts with brass or plated brass screw shells.
- C. HID lamps shall self-extinguish upon breakage.
- D. Provide lamps in color temperature, size, and shape as indicated in the Luminaire Schedule.
- E. Provide high-pressure sodium lamps; NEMA C78.42, wattage, color temperature, and burning position as scheduled, CRI 21 (minimum), and average rated life of 24,000 hours.
- F. Provide metal-halide lamps; ANSI C78.1372, wattage, color temperature, and burning position as scheduled, CRI 65 (minimum).
- G. LED lamps shall comply with ANSI C78.377, 2008 using a 4-step Macadam ellipse of the 2700K or 3000K points on the Planckian Locus (color binning). Color-rendering index, CRI shall be greater than 90. Lamps shall have an R9 value greater than 50, measured under the same conditions as the CRI. LED lamps shall be dimmable without flicker from 10-100%. Power factor shall be greater than 0.9. Lamp life shall be greater than 25,000 hours and lumen maintenance shall be greater than 80% of initial output at 40% of rated life.

2.5 EMERGENCY EXIT and EGRESS LUMINAIRES

- A. Emergency exit and egress luminaires shall be completely self-contained, provided with a maintenance-free 12 volt battery, automatic charger, and other features. Luminaires must be

third-party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, North Carolina State Building Code, Energy Conservation Code, NFPA-101, and NEMA standards.

- B. The battery shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. It shall have a normal life expectancy of 10 years. Batteries shall be a high-temperature type with an operating range of 0 degrees C to 60 degrees C, and contain a re-sealable pressure vent, a sintered + positive terminal and – negative terminal.
- C. The charger shall be fully-automatic, solid-state type, full-wave rectifying, with current limiting. The 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 percent. 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.
- D. A pilot light shall be included to indicate the unit is connected to AC power. The battery shall have a high-rate-charge pilot light, unless self-diagnostic type. A test switch shall 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.
- E. Emergency egress luminaires shall include two lamps. Egress luminaires utilizing fluorescent lamps shall include an LED charging indicator light that is easily visible after installation and a remote test switch shall be installed adjacent to the fixture.
- F. Emergency exit luminaires shall utilize LED lamps. 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.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all mounting hardware necessary for installing luminaires at indicated locations.
- B. Lighting fixtures:
 - 1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - 2. Install lamps in each luminaire.
- C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- D. Coordinate mounting height of wall-mounted fixtures with Architect prior to rough-in.
- E. Where a recessed fixture replaces a section or part of a ceiling tile provide the following in addition to mechanically attaching the fixture to the grid:
- F. Less than 10 lbs – support the fixture using manufacturer-supplied
 - 1. mounting and one (1) 12-gauge vertical hanger wire. Wire may be slack.
 - 2. 10 to 56 lbs - support the fixture at two (2) opposite corners. Wire may be slack.
 - 3. Greater than 56 lbs – support the fixture directly from the building structure.
 - 4. Wire supports shall be the same type of wire as used to support the lay-in ceiling track or 12-gauge vertical hanger wire (whichever is larger). Attach one end of the wire to one corner of the

luminaire and the other end to the building's structural system. The connection device from vertical wire to structure above must sustain a minimum of 100 lbs. Maintain plumb of vertical hanger wires up to a maximum of 1 in 6.

- G. Support surface-mounted fixtures by attaching directly to the ceiling grid.
- H. Support pendant-hung fixtures directly from the structure using manufacturer-supplied cable unless noted otherwise.
- I. Provide a six (6) foot (maximum) flexible whip for each recessed and semi-recessed fixture. Provide full-sized, insulated grounding conductor in each whip. Whips between tandem-wired fixtures shall be 11 feet in length. Support whips independent of ceiling tiles and ceiling grid.
- J. Wear clean cotton gloves when handling reflective surfaces.
- K. Remove any protective plastic bags or films from fixtures prior to Final Inspection.
- L. Adjust aimable fixtures, as directed, to provide required light intensities.

3.2 IDENTIFICATION

- A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

END OF SECTION 265100