Restroom Renovations

Alamance County Court Services Building

201 West Elm Street
Graham, NC 27253

Alamance County Quote Number: RFQ #16-Q001

Commission # 15-11 June 25, 2015

Revised: July 02, 2015

Ricky L. Loman, AIA Phone (336) 273-7999 **Architect**
603 Summit Avenue, Suite 102 Fax (336) 273-7999 Greensboro, N.C. 27405-7700
email: rloman@bellsouth.net

Sole Source Engineering P.C. Phone (336) 446-6911 **Consulting Engineers**
207 East Main Street Fax (336) 446-1550 Gibsonville, N.C. 27249
email: ssengr@triad.rr.com

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720 West Main Street Fax (336) 454-0892 Jamestown, N.C. 27101
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Set Number: _____

T A B L E O F C O N T E N T S

INDEX	NUMBER OF PAGES
DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS	
INTRODUCTORY INFORMATION	
000000 COVER SHEET AND TABLE OF CONTENTS	5
000115 DRAWINGS ACCOMPANYING THESE SPECIFICATIONS	1
001113 NOTICE TO BIDDERS	2
PROCUREMENT REQUIREMENTS	
002112 ALAMANCE COUNTY INSTRUCTIONS TO BIDDERS	7
002113 INSTRUCTIONS TO BIDDERS (Project Specific)	3
CONTRACTING REQUIREMENTS	
004213 FORM OF PROPOSAL	2
CONDITIONS OF THE CONTRACT	
007200 GENERAL CONDITIONS	1
007213 SAMPLE TOILET RENOVATION CONTRACT	3
007300 SUPPLEMENTARY GENERAL CONDITIONS	1
DIVISION 01 GENERAL REQUIREMENTS	
011100 SCOPE OF WORK	1
013323 SHOP DRAWINGS, PRODUCT DATA, SAMPLES	3
014300 QUALITY CONTROL	1
015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS	3
016000 PRODUCT REQUIREMENTS	3
017000 EXECUTION AND CONTRACT CLOSEOUT	1
DIVISION 02 EXISTING CONDITIONS	
024100 DEMOLITION	3
DIVISION 03 CONCRETE	
THIS DIVISION NOT USED	
DIVISION 04 MASONRY	
040519 MASONRY ANCHORAGE AND REINFORCEMENT	1
042000 UNIT MASONRY	4
DIVISION 05 METALS	
054000 COLD FORMED METAL FRAMING	4

T A B L E O F C O N T E N T S

INDEX	NUMBER OF PAGES
DIVISION 06 CARPENTRY	
060100 ROUGH CARPENTRY	4
DIVISION 07 MOISTURE PROTECTION	
072116 FIBERGLASS INSULATION	3
079200 CAULKING & SEALANTS	3
DIVISION 08 DOORS, WINDOWS, GLASS	
081100 HOLLOW METAL DOORS & FRAMES	2
081400 WOOD DOORS	3
083100 ACCESS DOORS AND PANELS	3
087100 FINISHED HARDWARE	2
088100 GLASS AND GLAZING	5
DIVISION 09 FINISHES	
092500 GYPSUM DRY WALL	3
093016 QUARRY AND CERAMIC TILE	3
095100 ACOUSTICAL CEILINGS	1
096050 RESILIENT TILE FLOORING	2
099000 PAINTING	4
DIVISION 10 SPECIALTIES	
101400 SIGNAGE AND GRAPHICS	1
102113 TOILET COMPARTMENTS	4
102813 TOILET ACCESSORIES	2
DIVISION 11 EQUIPMENT	
THIS DIVISION NOT USED	
DIVISION 12 FURNISHINGS	
THIS DIVISION NOT USED	
DIVISION 13 SPECIAL CONSTRUCTION	
THIS DIVISION NOT USED	
DIVISION 14 CONVEYING SYSTEMS	
THIS DIVISION NOT USED	
DIVISIONS 15-21	
THESE DIVISIONS NOT USED	

T A B L E O F C O N T E N T S

INDEX	NUMBER OF PAGES
DIVISION 22 PLUMBING	
220500 BASIC PLUMBING REQUIREMENTS	4
220553 PLUMBING IDENTIFICATION	2
220700 PLUMBING INSULATION	3
221100 FACILITY WATER DISTRIBUTION	8
221300 FACILITY SANITARY SEWERAGE	6
224000 PLUMBING FIXTURES	6
DIVISION 23 HEATING, VENTILATING & AIR-CONDITIONING	
230500 BASIC MECHANICAL REQUIREMENTS	3
230529 SUPPORTS AND ANCHORS	4
230593 TESTING, ADJUSTING, AND BALANCING	6
230700 DUCTWORK INSULATION	3
233000 DUCTWORK ACCESSORIES	4
233100 DUCTWORK	4
233400 HVAC FANS	3
233700 AIR OUTLETS AND INLETS	2
DIVISION 24-25	
THESE DIVISIONS NOT USED	
DIVISION 26 ELECTRICAL	
260000 INDEX OF SPECIFICATIONS	1
260500 COMMON WORK RESULTS FOR ELECTRICAL	5
260519 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE	5
260529 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	3
260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS	5
260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS	5
262726 WIRING DEVICES	4
265100 INTERIOR LIGHTING	4
DIVISION 27	
THIS DIVISION NOT USED	
DIVISION 28 ELECTRONIC SAFETY AND SECURITY	
THIS DIVISION NOT USED	
DIVISION 29-30	
THESE DIVISIONS NOT USED	
DIVISION 31 EARTHWORK	
THIS DIVISION NOT USED	

T A B L E O F C O N T E N T S

INDEX **NUMBER OF PAGES**

DIVISION 32 SITE IMPROVEMENTS

THIS DIVISION NOT USED

DIVISIONS 33-49

THESE DIVISIONS NOT USED

DIVISION 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

SECTION 000115 DRAWINGS ACCOMPANYING THESE SPECIFICATIONS

General Construction

Sheet:	Title:
T1	APPENDIX B - BUILDING CODE SUMMARY
A1	BUILDING FLOOR PLAN
A2	LARGE SCALE TOILET PLANS
A3	SCHEDULES & DETAILS
P1	PLUMBING DEMOLITION, HOT AND COLD WATER PLAN
P2	PLUMBING WASTE PLAN & SCHEDULES
M1	HVAC PLAN
E1	ELECTRICAL PLAN

End of Section

Alamance County

Purchasing Department
124 West Elm Street
Graham, North Carolina 27253
Telephone (336) 570-4072 Fax (336) 228-3903

Randy Clark
Manager

July 7, 2015

REQUEST FOR WRITTEN QUOTES

Alamance County is soliciting written quotes for the ***Restroom Renovations located in the Alamance County Court Services Building, 201 West Elm Street Graham NC 27253.*** Quotes will be received until 2:00 pm, August 4, 2015. 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: Restroom Renovations
Quote #16-Q001
Attn: Randy Clark

This project consists of providing all materials and labor for the renovation of both the Men's and Women's restrooms. 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 July 21, 2015 located on site at 201 W. Elm Street Graham NC 27253. 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. Richard Hill, Alamance County Facilities Director. Phone numbers are (336) 570-4197 and (336) 214-6565 email: Richard.Hill@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.

There is no Bid bond or Performance & Payment bonds 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.

Alamance County Maintenance Department
Alamance County, North Carolina

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.

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.

      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.

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.

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:

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.

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, Tuesday, August 04, 2015.

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 Tuesday, July 21, 2015**.

10. **QUESTIONS AND CLARIFICATIONS:**
Bidders will have until **5:00 P.M. local time, Wednesday, July 29, 2015** 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 30 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:

Contractor's are hereby notified that they must have proper license under the State laws governing their respective trades and that North Carolina General Stature 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 One Hundred Twenty (120) 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 school hours, unless approved by the Owner.

C. Work is to be accomplished in two phases to allow for uninterrupted access to toilet facilities in the building:

First Phase: Demolition and completion of Men's Toilet 102 and addition of the new hallway water coolers.

Second Phase: Demolition and completion of Janitor's Closet 102 and Women's Toilet 103.

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:

"Restroom Renovations
Quote #16-Q001
Alamance County Court Services Building
201 West Elm Street
Graham, North Carolina 27253

Attn: Randy Clark"

Include North Carolina Contractor's license on envelope.

End of Section

Form of Proposal
Restroom Renovations

Alamance County
Court Services Building

201 West Elm Street
Graham, North Carolina 27253

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 “Restroom Renovations, Alamance County Court Services Building, 201 West Elm Street, Graham, North Carolina 27253” 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 $_____

_____

TIME FOR COMPLETION:
The bidder further proposes and agrees hereby to commence work under this contact upon receipt of a purchase order and a written notice to proceed from the Owner, and shall substantially complete all work One Hundred Twenty (120) 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)

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

COUNTY OF ALAMANCE

RESTROOM RENOVATION AGREEMENT

This AGREEMENT, made this the _____ day of _____ 2015, by and between ALAMANCE COUNTY, a political subdivision of the State of North Carolina, 124 West Elm Street, Graham, North Carolina, 27253 hereinafter called the Owner, and _____, _____ Road, _____, North Carolina, hereinafter called the Contractor:

W I T N E S S E T H:

WHEREAS, the Owner has need to renovate the restrooms in the Alamance County Court Services Building, 201 West Elm Street, Graham, NC 27253, 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 _____, 2015 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 _____, 2015, 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 renovation of the restrooms located in the Alamance Courts Services building. The building is located at 201 West Elm Street, Graham, North Carolina 27253.

A brief description of work in the Project follows:

- Removal of selected partitions, ceilings, flooring, toilet partitions, and plumbing fixtures as shown on the drawings. This to be followed by the installation of new partitions, ceilings, flooring, plumbing fixtures, toilet partitions and accessories as noted on the drawings and described in the project specifications.
- Project start date is _____, 2015. Project duration should not exceed 120 days from date of award.
- 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 $0,000.00 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:_____
Craig F. Honeycutt, County Manager

ATTEST:

_____
Tory Frink, Clerk

_____, INC.

(SEAL)

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 - Remove existing masonry, tile flooring, wooden toilet partitions, plaster ceilings, plumbing fixtures, doors and frames.

C. Division 03 - Concrete:
Concrete for repair of existing surfaces where removed for the installation of new utility piping tie-ins.

D. Division 05 - Metals:
Cold formed metal framing.

E. Division 06 - Wood and Plastics:
Wood blocking.

F. Division 07 - Moisture Protection:
Caulking and sealants.

G. Division 08 - Doors, Windows, and Glass:
1. Hollow Metal Doors & Frames.
2. Wood Doors.
3. Finished Hardware.

H. Division 09 - Finishes:
1. Gypsum Drywall.
2. Quarry and Ceramic Tile.
3. Acoustical Ceilings & Grid.
4. Porcelain Ceramic Tile Flooring
5. Painting.

I. Division 10 - Specialties:
1. Toilet Partitions.
2. Toilet Accesories.
3. Toilet signage and graphics.

J. Division 22 - Plumbing:
New plumbing fixtures and piping.

K. Division 23 - Heating, Ventilating & Air-Conditioning.
1. Roof top toilet exhaust fans.
2. Ductwork, grilles, and registers.
3. Controls and wiring.

L. Division 26 - Electrical:
1. Power outlets.
2. Electrical switches, wiring, conduit, etc. as noted on the drawings.
3. Lighting fixtures.

M. Division 31 - Earthwork:
Excavation for underground utilties.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

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 Contractor shall be permitted access to the facility on the days noted at the prebid meeting or during normal business hours until the project completion date. Access at other times must be approved by the Alamance County Maintenance Department and the facility manager.
- B. The Owner should be advised at least 24 hours prior to commencement of any work which could affect facility operations.
- C. 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 approved in advance.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (CONTINUED)

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.

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.

DIVISION 01 GENERAL REQUIREMENTS

SECTION 015000 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (CONTINUED)

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.

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. Demolish and remove in its entirety the following items:
   1. Sections of existing concrete floor necessary for the installation of new underslab utilities.
   2. Existing masonry walls where noted on the drawings.
   3. Hollow metal frames.
   4. Wood doors and hardware.
   5. Existing ceramic tile flooring and wainscots.
   6. Existing carpeting in former office areas.
   7. Existing plaster ceilings.
   8. Acoustical tile ceilings and ceiling grid.
   9. Plumbing, HVAC, and electrical items shown on the drawings and within the space necessary for removal to accommodate the new work.
   10. Miscellaneous items not listed above which must be removed for completion of the work.
   11. Patch and repair all remaining materials suitable for installation of new finishes as noted on the drawings.

B. Removal of all debris from the site.

C. Obtain necessary permits and comply with all local ordinances for demolition work and disposal of construction debris.

D. Provide temporary partitions and dust barriers for noise, dust control and protection, existing construction to remain, and equipment.

E. Cap and identify exposed utilities, connect utilities to remain as shown on the drawings.

F. 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.

G. 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.

DIVISION 02. SITE WORK

SECTION 024100 DEMOLITION (CONTINUED)

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.
- 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

DIVISION 02. SITE WORK

SECTION 024100 DEMOLITION (CONTINUED)

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.

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 04. MASONRY

SECTION 041500 MASONRY ANCHORAGE AND REINFORCEMENT

PART 1 GENERAL

1.01 Work Included:
Corrugated ties.
1.02 Related Sections:
Unit Masonry (Section 042000).
1.03 Shop Drawings.

PART 2 PRODUCTS

2.01 Masonry ties by one of the following manufacturers:
A. Masonry Reinforcing Corporation of America.
B. Dur-O-Wal, Inc.
C. Hohmann & Barnard, Inc.
D. or approved equal.
2.02 Corrugated ties:
A. Carbon steel ASTM A1008 / A1008M.
B. Hot dip galvanized after fabrication / zinc coating:
ASTM A153 / A153M - B2 (1.50 oz. per sq. ft.).
C. 16 gauge.
D. 7/8" wide x 7" long.

PART 3 EXECUTION

3.01 Masonry ties:
Masonry piers:
A. 8" on center vertically in new mortar joints, unless otherwise noted.
B. Fasten to existing masonry walls with mechanical fasteners.

End of Section

DIVISION 04 MASONRY

SECTION 042000 UNIT MASONRY

PART 1 - GENERAL

1.01 Work Included.
- A. Common brick.
- B. Concrete block.
- C. Concrete block lintels.
- D. Concrete brick.
- E. Mortar.
- F. Cleaning.

1.02 Related Sections:
Masonry Reinforcement (Section 041500).

1.03 References:
- A. ACI 216.1/TMS 0216.1:
  Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.
- B. ASTM C55:
  Standard Specification for Concrete Brick.
- C. ASTM C90:
  Standard Specification for Loadbearing Concrete Masonry Units.
- D. ASTM C140:
  Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units.
- E. ASTM C330:
  Standard Specification for Lightweight Aggregates for Structural Concrete.
- F. ASTM C331:
  Standard Specification for Lightweight Aggregates for Concrete Masonry Units.

1.04 Submittals:
- A. The masonry producer to submit mix designs applicable to the masonry units submitted for approval prior to any on-site deliveries.
- B. Certification:
  The producer of the lightweight concrete masonry units shall furnish a letter of certification stating:
  1. No bottom ash aggregates are in the block.
  2. All lightweight aggregate used in the manufacture of the units was Stalite or other approved rotary kiln expanded slate, clay, or shale conforming to ASTM C331 and C330 specifications.
  3. ASTM C90 Test Report certification and note meeting UL 618.
  4. ACI 216 fire rating calculations.
  5. Submit certification and certificate by an independent testing facility recognized by USGC that the lightweight aggregates are 100% recycled material.
- C. Cleaning solution data if required.

PART 2 - PRODUCTS

2.01 Brick:
Common brick:
- A. Modular size, hard burned clay or shale free from cracks.
- B. Conforming to ASTM C62-69, Grade SW.

2.02 Hollow concrete block:

A. General:
   1. All units shall be free of organic impurities that cause rusting, staining, or pop outs and shall contain no combustible matter.
   2. The use of coal ash aggregate, bottom ash, cinders, or similar waste products shall not be allowed.
   3. Fly ash, complying with ASTM C618 may be used as a supplementary cementious material at the manufacturer's discretion.
   4. All 8 inch or largers units shall meet ACI 216.1 requirements for a two hour or greater fire rating.
   5. Aggregates:
      Stalite or other approved rotary kiln expanded shale clay or slate lightweight aggregate conforming to ASTM C331 and C330 specifications.

B. Lightweight concrete masonry units.
   1. Hollow load bearing units to conform to ASTM C-90, Grade N-1.
   2. Solid load bearing units to conform to ASTM C-145, Grade N-1.
   3. Units shall not exceed 93 pounds/cu. ft. density as determined in ASTM C140.

C. Size: Modular, thickness as indicated on the drawings, or equal to existing masonry walls.

D. Minimum equivalent thickness of units to meet all requirements of UL-618.

E. Aggregate: All units shall be certified as 100% Stalite or ESCSI Smart Wall System using approved rotary kiln expanded shale, clay, or slate aggregates.

F. Strength: 1,000 psi minimum at 28 days.

2.03 Concrete brick:
Same as hollow block.

2.04 Mortar:

A. Masonry cement:
   1. Portland Cement, Type I or II
   2. Conforming to requirements of Standard Specification for Portland Cement (ASTM C-150)
   3. Type S.

B. Sand:
   1. Shall meet the requirements of Standard Specification for Aggregate for Masonry Mortar (ASTM C-144-84), gradation to satisfy paragraph 4, Grading, with the omission of subparagraph 4.4.
   2. Clean, hard, sharp, free from organic matter, alkali and soft particles.

C. Lime:
   1. Hydrated Lime:
      Shall meet the requirements of the Standard Specification for Hydrated Lime for Masonry Purposes (ASTM C-207), Type S or Type M.
   2. Hydraulic Hydrated Lime:
      Shall meet the requirements of the Standard Specification for Hydraulic Hydrated Lime for Structural Purposes (ASTM C-141).

D. Water: Potable.

E. Admixture workability and air entraining admixtures may be utilized and shall conform to ASTM C-260.

F. Proportions:
Type S - (ASTM C-270, latest edition) - by volume one part portland cement; 1/2 part hydrated lime; masonry sand, measured in a damp loose condition, is to be not less than 2.1/2 nor more than 3 times the sum of the volumes of cement plus line used. Plasticizer, per instructions of the manufacturer, the quantity of which is not to exceed 2% by volume of the cement and lime combination.

G. Color: To match existing mortar joints.

DIVISION 04 MASONRY

SECTION 042000 UNIT MASONRY (CONTINUED)

PART 3 - EXECUTION

3.01 Joints:
- A. Nominally 3/8 inch wide, to match existing.
- B. Visible joints, slightly concave, or raked if necessary to match adjacent coursing.
- C. Concealed joints, struck smooth.

3.02 Bond:

Concrete Block: Running.

3.03 General:
- A. Hot weather: Wet before laying except for units having absorption less than 5 percent.
- B. Freezing weather: Do not lay masonry in freezing temperatures except in enclosed spaces and when materials can be heated. Cover and otherwise maintain temperatures above 35 degrees.
- C. Exposed faces with chipped edges, cupped units, or other defects will not be accepted.
- D. Ties and Anchors:
  See SECTION 04150.
- E. Lay all units with full bed joints with units pressed firmly into place; butter ends of units before joining. Slush interior joints with mortar.
- F. Shove all masonry work.
- G. Lay to true dimensions, level and plumb, with vertical joints aligned, joints of uniform width.
- H. Do not use mortar that is partially set, lumpy or frozen. Use precautions to prevent partially set mortar from coming in contact with new batches of mortar.
- I. Keep exposed faces free from mortar.
- J. Minimum of three courses of solid units at all steel bearing.
- K. Where butt joints occur at intersection of partitions, and partitions and walls, rake vertical joints to receive caulking.
- L. Fill all masonry cells and cavities where shown on the drawings, and below grade line or finish floor with concrete.
- M. Provide expansion joints in masonry walls where shown on drawings or at a maximum of 30'-0" on center. Locations to occur at window or door openings, wall offsets, intersections where walls are different heights, etc. Verify placement and location of all expansion joints with the Architect.

3.04 Weeps:
- A. Provide weep holes at base of all wall cavities, lintels, membrane flashing, shelf angles, and as noted on the drawings, placed on top of flashing membrane.
- B. Space 2'-0" on centers, unless otherwise noted.
- C. If not otherwise shown, fabricate with open head joints.
- D. Exercise care to keep weeps and base of wall cavities free of mortar droppings.

3.05 Cleaning:
- A. Cleaning to be done daily.
- B. Protect all materials subject to damage by cleaning.
- C. Remove large particles of mortar with wood paddles.
- D. Masonry which has been laid in place shall be covered and protected from mortar droppings above, and the possibility of damage from water splashed debris by rain or nearby work.
- E. If additional cleaning should be necessary, such cleaning shall be only with the approved cleaning solutions noted below, solutions containing acid shall not be used.
- F. Pre-soak wall to prevent drawing approved cleaning solution and dissolved mortar into the

DIVISION 04 MASONRY

SECTION 042000 UNIT MASONRY (CONTINUED)

brick.

G. Scrub masonry with bristle brushes and solution of Sur-Klean 600, Vanatrol, Superior 800, or other approved cleaning solution as approved by the Architect and the masonry manufacturer.

H. Flush thoroughly with clean water to remove all cleaning agent and dissolved mortar.

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:
- A. Gypsum dry wall (Section 09250).
- B. I-Stud sections for use with shaftwall construction (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 01320.
- 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 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 gage.
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.
G. Primer: Zinc-rich primer for galvanized surfaces conforming to FS TT-P-645.

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING (CONTINUED)

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 of track.
  8. Install studs 16 inches on center, unless otherwise noted on drawings, maximum

DIVISION 05. METALS

SECTION 054000 COLD FORMED METAL FRAMING (CONTINUED)

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.
12. Placement of insulation between studs after erection is specified in Section 07210.

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 06 CARPENTRY

SECTION 061000 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. Miscellaneous wood blocking or concealed plywood blocking panels.
- B. Other locations where noted on the drawings.

1.02 References:
- 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.

1.03 Submittals:
- A. Submit under provisions of Section 013323.
- B. Submit treatment manufacturer's instructions for proper use of each type of treated material.
- C. For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
- D. 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.

1.03 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.

1.04 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.

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, fo 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, Douglas Fir (WCLB or WWPA) or Southern Pine (SPIB).

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:

DIVISION 06 CARPENTRY

SECTION 061000 ROUGH CARPENTRY (CONTINUED)

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 t receive wood preservative treatment.

B. Grade:
Construction grade light framing size lumber of any species or board size lumber as 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 Equipment Backing Panels:
For 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".

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/anchorages with hot-dip zinc coating (ASTM A-153).

2.10 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 AWPA 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

DIVISION 06 CARPENTRY

SECTION 061000 ROUGH CARPENTRY (CONTINUED)

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.

C. All fasteners used with pressure treated wood to be hot dipped galvanized ring-shank nails or screws.

2.11 Adhesives:

By Contech, or approved equal.

A. Interior: PL400, heavy duty sub-floor adhesive.

B. Exterior: PL500, deck and treated lumber adhesive.

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; pre-drill as required.

3.02 Wood Grounds, Nailers, Blocking, and Sleepers:

A. Provide wherever shown and where required fo 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 form work 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 Installation of Plywood:

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.

C. Install with face panels perpendicular to supports.

D. Stagger end joints.

E. Apply a 3/8 inch bead of sub-floor adhesive to all structural members prior to installing sheathing.

F. Use nails, 8d ring shank, 6 inches on centers at edges, 12 inches on center at intermediate supports.

G. All end joints must occur over supports.

H. Maintain minimum 1/32 inch gap at all joints.

I. Avoid deflection between supports prior to nailing.

End of Section

DIVISION 06 CARPENTRY

SECTION 061000 ROUGH CARPENTRY (CONTINUED)

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

DIVISION 07. MOISTURE PROTECTION

SECTION 072116 FIBERGLASS INSULATION (CONTINUED)

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. All 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: Minimum R-13 for 3.1/2":

1. Thickness: as noted on the draiwngs.
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

DIVISION 07. MOISTURE PROTECTION

SECTION 072116 FIBERGLASS INSULATION (CONTINUED)

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 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:

Property	Test Method	Value
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 081100 HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 Section Includes
- A. Steel door frames.
- B. Shop paint.
- C. Shop drawings.

1.02 Related Sections
- A. Hardware (Section 087000).
- B. Hardware Templates (Section 087000).

1.03 Shop Drawings
- A. Metal frames.
- B. Note primer formulation.
- C. Submit under provisions of Section 013323.

PART 2 - PRODUCTS

2.01 General:
Provide standard steel doors / frames by a single firm specializing in production of this type of work.

2.02 Steel Door Frames:
- A. As manufactured by Amweld Building Products Division, Republic Builders Products, Steelcraft Manufacturing, Fenestra, Ceco Corporation, or approved equal.
- B. Steel door frames to comply with SDI Recommended Specifications: Standard Steel Doors and Frames (SDI-100) and as herein specified.
- C. Double rabbet.
- D. Construction:
  1. 16 Gauge (U.S.A.) Prime quality cold rolled, pickled, annealed stretcher leveled steel.
  2. Galvannealed at exterior installations.
- E. Sizes as indicated on drawings.
- F. Fabrication:
  1. Welded construction: unit welds conforming to AWS.
  2. Knock-down frames may be used for single door frames with prior approval.
- G. Joints mitered and welds ground smooth.
- H. Fill hairline joints with mineral filler.
- I. Reinforcement:
  1. 1/8 Inch for surface applied hardware.
  2. 3/16 Inch thick for butts, 3 each frame.
  3. Other, 12 gauge.
- J. Drill and tap to receive all mortise hardware.
- K. Cover all mortised areas with 26 gauge material.
- L. Anchor at bottom of each jamb to secure to floor.
- M. Jamb anchors:
  1. Masonry anchors:
     Loose tee.
  2. Existing masonry walls:
     Existing wall anchor, 18 gauge steel, to add support for bolting the frame into the rough opening of an existing wall.
  3. Drywall partitions:
     Lock-in 18 gauge steel.
  4. Minimum 3 per jamb, more if noted on drawings.
- N. Three rubber door silencers each door.
- O. Steel spreader, base each frame.
- P. Clean thoroughly of oil, grease and other impurities, protecting with bonderite coating.
- Q. Shop coat inside and out of gray zinc chromate rust inhibiting baked prime coat.
- R. Fire label requirements:
  1. National Fire Protection Association (NFPA):

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081100 HOLLOW METAL DOORS AND FRAMES (CONTINUED)

A. NFPA 80 Fire Doors and Windows.
B. NFPA 252 Standard Method of Fire Tests for Door Assemblies.

2. Underwriters Laboratories, Inc. (UL):
   A. UL 10B Fire Tests of Door Assemblies.
   B. UL 10C-1998 Neutral Pressure Fire Test of Door Assemblies (positive pressure rating required at vertical shaft enclosures).
   C. Directory of Certification Listings for Fire Doors.
3. ASTM International:
   1. ASTM E152 Standard Methods of Fire Tests of Door Assemblies.
   2. ASTM E2074 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies (for doors at vertical shaft enclosures).
4. Refer to drawings for specific U.L. fire label requirements.

PART 3 - EXECUTION

3.01 Installation.
A. Erect plumb and true.
B Anchor securely at floor, jamb and head.
C. To maintain alignment provide spacer at intermediate point during construction of walls and partitions.
D. Templates will be furnished by finished hardware division, when written request is received.
E. Fit hollow metal doors accurately in frames, within clearances specified in SDI-100.

End of Section

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081400 WOOD DOORS

PART 1 - GENERAL

1.01 Work Included:
- A. Wood doors.
- B. Shop drawings and submittals.

1.02 Related sections:
Finished Hardware (Section 087000).

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, Inc. (UL):
  1. UL 10B Fire Tests of Door Assemblies.
  2. UL 10C-1998 Neutral Pressure Fire Test of Door Assemblies (positive pressure rating required at vertical shaft enclosures).
  3. Directory of Certification Listings for Fire Doors.
- C. ASTM International:
  1. ASTM E152 Standard Methods of Fire Tests of Door Assemblies.
  2. ASTM E2074 Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies (for doors at vertical shaft enclosures).
- D. Window and Door Manufacturers Association (formerly National Wood Window and Door Association):
  ANSI/WDMA (formerly NWWDA) IS-6-A-2001 Quality Standards of the Window and Door Manufacturers Association.
- E. National Fire Protection Association (NFPA):
  1. NFPA 80 Fire Doors and Windows.
  2. NFPA 252 Standard Method of Fire Tests for Door Assemblies.
- F. Warnock-Hersey International (WHI):
  Directory of Certification Listings for Fire Doors.
- G. Scientific Certification Systems (SCS) Standards for certifying recycled and recovered content of manufactured products.

1.04 Delivery, Storage & Handling:
- A. General:
  Comply with Division 01 Product Requirements Sections.
- 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.

1.05 Storage and Protection:
Store materials protected from exposure to harmful weather conditions and at temperature and relative humidity conditions recommended by manufacturer and referenced quality standard.
- A. Store doors flat on a level surface, in a clean, dry and well-ventilated area protected from sunlight. Do not subject doors to extreme heat, dryness or moisture.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081400 WOOD DOORS (CONTINUED)

1. Break seal (plastic protective packaging only) onsite to permit ventilation, if required.
2. Seal door edges immediately upon delivery, prior to storage.
3. Do not drag doors across one another.

1.06 Project Conditions:
Temperature and Relative Humidity Requirements:
Maintain temperature and relative humidity in spaces where products will be installed for time period before, during and after installation as recommended by manufacturer.

1.07 Field Measurements:
Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

1.08 Shop drawings and submittals:
A. Submit under provisions of Section 013323.
B. Submit manufacturers literature showing details of core and edge construction, trim for lite openings and louvers if applicable.
C. Manufacturer's warranties.

PART 2 - PRODUCTS

2.01 Flush panel interior wood doors:
A. Wood core doors:
1. Standard thickness, kiln and plate dried, good grade, rotary cut birch without mineral streaks, tapeless spliced, pairs matched.
2. Crossbands: 1/16 inch hardwood, tapeless spliced, full to four edges with no defects or voids.
3. Core:
A. Single panel thickness or 3 ply particle board.
B. Inner particle core with minimum resin content of 7% and minimum density of 25 pounds per cubic foot, modulus of rupture of 1500 psi.
C. Outer plys with minimum resin content of 14% and minimum density of 47 pounds per cubic foot.
4. Edgebands:
A. Top and bottom rails 1.1/2 Inches wide, built up kiln dried laminated hardwoods.
B. Stiles: 1.3/8 Inches thick after trimming outer strip to receive veneer to match face, built up of laminated hardwoods.
5. Glass openings: Provide metal glass kits for glazed openings where noted on the drawings.
6. Glass: See drawings for glazing requirements.
7. Refer to drawings for U.L. Fire Label requirements, "construction labeling" not acceptable for rated doors.

B. Manufacturer's warranty:
1. Doors will be of good material and workmanship and will free of defects which would make them unserviceable or unfit for ordinary and recommended use.
2. Manufacturer's limited warranty to be valid for the life of the installation against any defects which shall make them unsuitable for the use for which they are intended.
3. Doors must be inspected when received and before they are hung or fitted. If defects are noticed in any door, the door manufacturer must be notified in writing

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 081400 WOOD DOORS (CONTINUED)

within 30 days of the date the door is received describing the defect.

4. If a defect could not be discovered until after the door is hung or fitted, the door manufacturer must be notified in writing within one year of the date the door was shipped from the factory describing the defect.
5. If any door is found to contain defects as stated herein during the warranty period, the manufacturer will do one of the following:
   A. Repair the defect;
   B. Furnish a replacement door, provided that the original door is returned to the factory; or
   C. Refund the amount paid for the original door after receipt at the door at the factory.
   D. Shipping costs to be at the manufacturer's or contractor's expense.
6. Guarantee to be furnished after installation has been made by the contractor and an inspection by a representative of the door manufacturer.

PART 3 - EXECUTION

3.01 Comply with AWI Quality Standards.
3.02 Protect doors from damage before and after installation.
3.03 Allow doors to become acclimated to building heat and humidity before installation.
3.04 Do not install doors in frames that are set out of plumb.
3.05 Installation:
   A. Trim to leave equal width stiles and headrail.
   B. Fit snugly without binding and with equal clearance around door with frame.
   C. Make hardware cuts neat and true.
   D. Immediately after hanging, remove and prime top and bottom edges.

End of Section

DIVISION 8. DOORS, WINDOWS, GLASS

SECTION 083100 ACCESS PANELS

PART 1 - GENERAL

1.01 Summary:
Section includes new crawl space access panel.

1.02 Related Sections:
A. Section 099000 (Painting).
B. Section 04200 (Unit Masonry).

1.03 System Description:
Verification: Obtain specific locations and sizes for required access doors and frames from trades, including mechanical and electrical, requiring access to concealed equipment and indicate on submittal schedule.

1.04 Submittals:
A. General:
In accordance with conditions of Section 013323.
B. Shop drawings.
1. Door and panel units:
Show types, elevations, thickness of metals, full size profiles of door members.
2. Hardware:
Show materials, finishes, locations of fasteners, types of fasteners, locations and types of operating hardware, and details of installation.
3. General:
Show connections of units and hardware to other Work. Include schedules showing location of each type and size of door and panel units.
C. Product Data: Manufacturer's technical data for each type of access door and panel assembly, including setting drawings, templates, fire-resistive characteristics, finish requirements, and details of anchorage devices. Include complete schedule, types, locations, construction details, finishes, latching or locking provisions, and other pertinent data.
D. Manufacturer's Installation Instructions: Indicate installation requirements and rough-in dimensions.

1.05 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.
C. Fire-Resistance Ratings:
Wherever a fire-resistance classification is indicated, provide access door and panel assemblies with panel door, frame, hinge, and latch from manufacturer listed in Underwriter's Laboratories (UL), "Building Materials Directory" for rating shown.
1. Provide 90 minute UL label at 2-hour rated partitions.
2. Provide 3 hour Warnock Hersey label at horizontal applications, up to 24 inch wide x 36 inch high.
3. Provide 2 hour Warnock Hersey label at horizontal applications greater than 24 inch wide x 36 inch high.
D. Size Variations:
Obtain Architect's acceptance and approval of manufacturer's standard size units that may vary slightly from sizes indicated on Drawings.
E. Coordination:
Provide inserts and anchoring devices that will be built into other Work for installation of access door assemblies. Coordinate delivery with other Work to avoid delay.

DIVISION 8. DOORS, WINDOWS, GLASS

SECTION 083100 ACCESS PANELS (CONTINUED)

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:
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, but not more than one and one half (1 ½) years from the date of shipment. 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. The Williams Bros. Corporation of America
- B. Acudor Products, Inc.
- C. Milcor, Inc.
- D. Bystrom Building Products.
- E. Or approved equal.

2.02 Materials:
Galvanized, bonderized steel with baked on rust inhibitive gray primer.

2.03 Access Panels:
Constructed with one-piece frame with the door panel mounted to the frame on concealed hinges for complete access without allowing the door to impact the wall.
- A. Acceptable models:
  1. Milcor Style M.
  2. Nystom Model NT.
  3. The William Bros. Corp. WB BASIC 300.
  4. Acudor UF-5000.
  5. Or approved equal.
- B. Door:
  Fabricate from minimum 16-gauge cold rolled sheet steel
- C. Frame:
  Fabricate from minimum 16-gauge cold rolled steel of configuration to suit material application.
- D. Flange:
  One-piece outer frame, 1 inch wide, welded to mounting frame.
- E. Hinge:
  1. Continuous, fully concealed.
  2. Capable to be opened to 175 degrees.
  3. Placed on short side of door, unless otherwise shown.
- F. Latching/Locking mechanism:
  1. Key operated latch bolt - standard.
  2. Furnish with 2 keys per lock, all doors keyed alike.
- G. Finish: Galvanized, bonderized steel, with factory applied prime coat..

2.04 Fabrication:
- A. Manufacture each access panel assembly as an integral unit ready for installation.
- B. Welded construction: Furnish with a sufficient quantity of 1/4" mounting holes to secure access panels to types of supports indicated.

DIVISION 8. DOORS, WINDOWS, GLASS

SECTION 083100 ACCESS PANELS (CONTINUED)

C. Recessed panel: Form face of panel to provide specified recess for application of finish material. Reinforce panel as required to prevent buckling.
D. Furnish number of latches required to hold door in flush smooth pane when closed.

PART 3 - EXECUTION

3.01 Examination:
Verify conditions are ideal for suitable installation.
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. Follow manufacturer's instructions for installing access panels.
B. Set frames to proper alignment with the wall or ceiling.
C. Position access panels in locations shown on the drawings, or for proper access to concealed equipment requiring access.
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 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 - Men 101 to Corridor 100 RH
Door #3 - Women 103 to Corridor 100 RH
3'-0" x 6'-8" x 1.3/4" WD x HM

Each to have:

HA	3.0 Ea.	Ball Bearing Hinges	BB1279 (4.5" x 4.5") NRP	628
LCN	1.0 Ea.	Closer	4041 XP -H -SP - Cush x MC	689
IVE	1.0 Ea.	Push Plate	8200 - 4 x 16	US32D
IVE	1.0 Ea.	Pull Plate	8303 10" - 4 x 16	US32D
IVE	1.0 Ea.	Kick Plate	8400 - 8" x 2" LDW	US32D
IVE	1.0 Ea.	Wall Stop	WS401CCV	630
GJ	3.0 Ea.	Silencers	GJ64	Grey

HEADING #2

Door #2 - Corridor 100 to Janitor's Closet 102 RHR
2'-10" x 6'-8" x 1.3/4" WD x HM

Each to have:

HA	3.0 Ea.	Ball Bearing Hinges	BB1279 (4.5" x 4.5") NRP	628
CR	1.0 Ea.	Storeroom Lockset	CL3357	US26D
IVE	1.0 Ea.	Mop Plate	8400 - 8" x 2" LDW	US32D
GJ	3.0 Ea.	Silencers	GJ64	Grey

2.07 Keying:
All locks and cylinders are to be keyed into the existing master key system currently in use at this building.

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:
  Existing windows in new toilets with clear glazing.
- 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.
  3. Temporary labels shall remain intact until glass is approved by the Architect and

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

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:
   A. Insulated glass:

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

1. Thickness:
   Thickness to be equal to the width of the existing glazing.
2. Air spacer to be continuous, one piece, tin plated steel "U" channel.
3. Sealants:
   - A. Desiccated butyl to be extruded onto inside web of "U" channel, full perimeter.
   - B. Typical Insulated Glass: Minimum overall thickness equal to the existing glazing with two lites of 1/8 inch or 3/16 inch or 1/4 inch as size and loading require.
     1. Primary Sealant: Polyisobutylene applied to the edge of the spacer.
     2. Secondary Sealant: Silicone.
     3 Air Spacer: Continuous metal spacer with formed corners and an in-line connector, containing desiccant.
     4. Gas filling: None.
   - C. Exterior glass lite:
     1. Tint: clear.
     2. Type: fully tempered.
     3. 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:
        - A. U-Value: 0.45.
        - B. Solar Heat Gain Coefficient (SHGC): 0.25.
        - C. Testing to be in accord with NFRC 100 environmental conditions.
   - D. Interior glass lite:
     1. Tint: Obscure pattern #62 on inside (#3) surface of the interior lite.
     2. Type: fully tempered.

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

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

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.
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.

DIVISION 08. DOORS, WINDOWS, GLASS

SECTION 088100 GLASS AND GLAZING (CONTINUED)

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.
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. Moisture resistant gypsum tile backer board.
- C. Casing beads.
- D. Corner beads.
- E. Drywall screws.
- F. Joint treatments.

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 Gypsum tile backer board:
- A. Moisture-resistant gypsum core and microbial barrier with fiberglass mats with a heat-cured acrylic coating. The face side to be surfaced with heat-cured copolymer water and vapor retardant coating.
  1. Dens-Shield, as manufactured by G-P Gypsum Corporation, or approved equal.
  2. 5/8" thick x 4'-0" wide x 8'-0" long sheets.
  3. Fire resistance:
     Type X when tested in accordance with ASTM E 119.
- B. Accessories:
  1. Trim:
     Sheet steel zinc-coated by hot dip process.
  2. Fasteners:
     Type S-12, bugle or wafer head, 1" - 1.1/4" long, drill point fine thread self-tapping, rust resistant.
  3. Conform to requirements of ASTM C 840.

2.03 Casing beads:
Galvanized wallboard casing "J" trim, sized for wallboard thickness.

2.04 Corner beads:
1.1/4" x 1.1/4" galvanized corner reinforcement.

2.05 Drywall screws:
- A. Corrosion-resistant.
- B. 7/16" crown x length required to adequately penetrate substrate.
- C. Conform to requirements of ASTM C 840.

2.06 Joint treatments:
- A. Joint compound, perforated tape:
- B. To comply with ASTM C 475.
- C. Perforated or fiberglass tape.

DIVISION 09. FINISHES

SECTION 092900 GYPSUM DRY WALL (CONTINUED)

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.

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.

DIVISION 09 FINISHES

SECTION 092900 GYPSUM DRY WALL (CONTINUED)

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.

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).

3.04 Gypsum tile backer board:

A. General:
This installation to be in complete conformance with all recommendations of the approved tile backer board manufacturer, and the ceramic tile manufacturer.

B. Tile backer board:
Walls:
1. Install panels vertically or horizontally.
2. Locate joints at openings so no end joint will align with edges of opening.
3. Screw attach boards 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.
4. Stagger all joints, horizontally and vertically, on opposite faces of partition 24 inches minimum.
5. Place edges of boards in contact with each other but do not break surface.
6. Expansion joints not to exceed 30 linear feet of continuous wall.
7. Finished installation to be inspected by ceramic tile installer prior to installation of his work. Repair all installation defects that could affect appearance of finished tile.

End of Section

DIVISION 09. FINISHES

SECTION 093016 QUARRY AND CERAMIC TILE

PART 1 - GENERAL

1.01 Work Included:
- A. Porcelain stone floor and wall tile.
- B. Setting beds.
- C. Cleavage and crack suppression membrane for thin-set tile installations.
- D. Metal edge strips installed as a part of tile installation.
- E. Control joints.
- F. Marble thresholds.
- G. Installation.
- H. Samples.

1.02 Shop Drawings:
- A. Manufacturer's technical information/installation instructions for materials to be used.
- B. Samples of each type/color/finish of actual tiles specified.
- C. Samples of grout and accessories.
- D. As required by Section 013323.

1.03 Related Sections:
Caulking and Sealants (SECTION 079200).

PART 2 - PRODUCTS

2.01 Tile:
- A. Porcelain stone floor and wall tile:
  1. Continental Slate Colorbody Porcelain as manufactured by Dal-Tile and as noted and scheduled on the drawings, or approved equal.
  2. Size: Refer to the drawings.
  3. Colors: Refer to the drawings.
  4. Provide cove base, bullnose, cove base outcorners, and tapered finish edged tile at the exposed perimeter of all wall tile installations.
- B. All materials to bear the Tile Council of America Seal.

2.02 Setting beds and materials (thinset installation):
- A. Dry set mortar: conform to ANSI 118.1.
- B. Latex portland cement: conform to ANSI A118.4.
- C. Water: clean and potable.

2.03 Latex-portland cement grout:
- A. Conform to requirements of ANSI A118.6 and ANSI A108.
- B. Proprietary compound composed of portland cement with latex additive for more flexible/less permeable grout.
- C. Color:
  1. As manufactured by Daltile, Custom Building Products, Crossville Ceramics, or approved equal.
  2. Color, as noted on the drawings or to be selected.
- D. Provide product with latex additive which is compatible with latex additive in latex-portland cement mortar.
- E. Width: As recommended by the tile manufacturer.

2.04 Crack control, waterproofing, and cleavage membrane (floor tile):
One of the following:
- A. Schulter KERDI as manufactured by Schulter Systems L.P.
- B. Nobleseal TS as manufactured by The Noble Company.
- C. Approved equal.

2.05 Marble thresholds:
- A. As detailed on the drawings at all entry doors.
- B. Height:
  ½" maximum height above adjacent flooring.

2.06 Corner trim:
Provide metal grout strips at exposed corners.

2.07 Expansion joints:

DIVISION 09. FINISHES

SECTION 093016 QUARRY AND CERAMIC TILE (CONTINUED)

Sealant, fungicidal, one-part silicone rubber sealant, Dow Corning 782 or 784, or approved equal, meeting Federal Specification TT-001543, Class A or B (COM-NBS).

PART 3 - EXECUTION

3.01 General:
- A. Deliver packaged materials, store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions.
- B. Comply with manufacturer's instructions for mixing/installation of proprietary materials.

3.02 Crack control and cleavage membrane (floor tile):
Install in accord with membrane and tile manufacturer's written recommendations.

3.03 Preparation:
- A. Thoroughly clean surfaces of foreign materials prior to starting work (mastic, glue, adhesives, etc.).
- B. Install crack control and cleavage membrane for floor tile installation at all building expansion floor joints, control joints, cracks and deformities discovered in the existing concrete sub-floor.

3.04 Set and install in accordance with the applicable requirements of:
- A. USAS A108, 5-1969M.
- B. Tile Council of America specification numbers:
  1. Tile Floors: F113-latest edition.
  2. ANSI A108.5 (tile); ANSI 108.10 (grout), (tile installed with dry set or latex-portland cement mortar).
  3. Wall tile on gypsum board: W-223.

3.05 Installation (General):
- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated and approved by the Owner. Arrange pattern so that a full tile or joint is centered on each wall and that no tile less than 1/2 width is used. Do not interrupt tile pattern through openings. Align joints between floor and base tile.
- C. Expansion and control joints:
  1. Provide openings for joints where shown or to coincide with existing building control joints, and to comply with details. If not shown and detailed, comply with recommendations in TCA "Handbook for Ceramic Tile Installation".
  2. Sealants specified in Division 7.
- D. Extend tile work into recesses and under/behind equipment and fixtures to form complete covering without interruptions, unless otherwise shown.
- E. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- F. Accurately form intersections/returns; perform cutting/drilling of tile without marring visible surfaces.
- G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- H. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints.
- I. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so plates/collars/covers overlap tile.
- J. Form internal angles square and external angles bullnosed.
- K. Install ceramic accessories rigidly in prepared openings.
- L. Install non-ceramic trim in accordance with manufacturer's instructions. Terminate work neatly at obstructions/edges/corners without disrupting pattern or joint alignments.
- M. Install thresholds where indicated.
- N. Sound tile after setting. Replace hollow sounding units.
- O. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
- P. Allow tile to set for a minimum of 48 hours prior to grouting.
- Q. Grout tile joints. Use standard grout unless otherwise indicated.

DIVISION 09. FINISHES

SECTION 093016 QUARRY AND CERAMIC TILE (CONTINUED)

U. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
R. Prohibit foot/wheel traffic from using tiled floors for at least 3 days after grouting is completed.

3.06 Thin Set Installation Method:
A. Apply mortar or adhesive with notched trowel using scraping motion to work material into good contact with surface to be covered and on both sides of cleavage membrane. Maintain 90 percent coverage on back of tile and fully bed all corners. Extend cleavage membrane up wall behind cove base.
B. Apply only as much mortar or adhesive as can be covered within allowable windows as recommended by mortar or adhesive manufacturer or while surface is still tacky.
C. When installing large tiles, ceramics or mosaics, trowel small quantity of mortar or adhesive onto back of each tile or sheet of tiles.
D. Set tiles in place and rub or beat with small beating block.
E. Beat or rap tile to ensure proper bond and also to level surface of tile.
F. Align tile to show uniform joints and allow to set until firm.
G. Clean excess mortar or adhesive from surface of tile with wet cheese cloth (not a sponge) while mortar is fresh.
H. Allow face mounted tile to set until firm before removing paper and before grouting.

3.07 Cleaning:
A. Clean and polish in accord with material supplier's recommendations.
B. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not prior to 14 days after installation.
C. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning.
D. Flush surface with clean water before and after cleaning.
E. Leave finished installation clean/free of cracked, chipped, broken, unbonded, or otherwise defective tile work.
F. If recommended by tile manufacturer, apply protective coat of neutral protective cleaner to completed tile walls/floors.
G. Protect finished work with heavy Kraft paper or other heavy covering during construction and while other work is in progress.
H. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

End of Section

DIVISION 09. FINISHES

SECTION 095100 ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 Work included:
- A. Suspension system.
- B. Acoustical ceiling tile.

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. Exposed grid system:
  1. As manufactured by Chicago Metallic; Armstrong Ceiling Systems; Gordon Architectural Aluminum Specialities, Inc.; or approved equal.
  2. Main runners, cross runners, wall molding:
  3. Materials:
     - A. 15/16" white baked enamel finish on steel.
     - B. Armstrong Prelude XL, or approved equal.
     - C. Size to accommodate 24" x 24" lay-in panels.
- B. Acoustical Ceiling Tile:
  1. One of the following:
     - A. Armstrong Ceramaguard, moisture resistant, 24" x 24" x 5/8", square edge, #607.
     - B. Celotex Hytone Baroque Unperforated with Plastigard, Protectone, moisture resistant, 24" x 24" x 5/8", square edge, #BET-157.
     - C. USG Radar Ceramic ClimaPlus, moisture resistant, 24" x 24" x 5/8", square edge, Class 100 panels, #56644.
     - 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.

End of Section

DIVISION 09. FINISHES

SECTION 096050 RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 Work Included:
- A. Resilient tile floors (as required to repair corridor floors at locations of new doorways).
- B. Vinyl base.
- C. Cleaning, waxing, and polishing.

1.02 Samples:
Provide samples of tile for color selection (to match existing corridor floor tile).

PART 2 - PRODUCTS

2.01 Tile:
- A. Armstrong Cork Company; Congoleum Corporation.; Azrock Industries, Inc.; or approved equal.
- B. Armstrong Standard Excelon, Congoleum Alternatives, Azrock Cortina, or approved equal.
- C. 1/8 Inch gauge, 12 x 12 inches with true edges.
- D. Colors to be selected from manufacturer's standard patterns and colors to closely match existing floor.

2.02 Vinyl base:
- A. Marley Flexco; Roppe Corporation; Armstrong Cork Company; or approved equal.
- B. 4 inch high vinyl cove base.
- C. Color to match existing cove base.
- D. Ribbed back.
- E. .125 (1/8) inch thickness.
- F. Furnish matching premolded inside and outside corners with 2.1/4 inch returns.

2.03 Adhesives:
- A. Moisture resistant.
- B. As recommended by tile manufacturer for installation on concrete slab.

PART 3 - EXECUTION

3.01 Commencement of work implies acceptance of surfaces.
3.02 Clean floors free from grease, paint and dirt, with mechanical sander.
3.03 Fill depressions and cracks with crack filler.
3.04 Grind high and rough surfaces to smooth and level finish.
3.05 Spread only amount of cement that can be used before setting.
3.06 Push tile into place snugly, remove excess cement, roll with 100 pound or heavier roller in both directions.
3.07 Install cove base with nonflammable adhesive in complete accord with manufacturer's printed recommendations.
3.08 Clean and wax thoroughly in accordance with manufacturer's maintenance recommendations. Three coats of wax minimum.
3.09 Leave one full box of each color tile with Owner.

End of Section

DIVISION 09. FINISHES

SECTION 096500 RESILIENT TILE FLOORING (CONTINUED)

DIVISION 09. FINISHES

SECTION 099000 PAINTING

PART 1 - GENERAL

1.01 Work Included:
- A. Exterior:
  New exposed ferrous and galvanized metals.
- B. Interior:
  1. Masonry walls.
  2. Gypsum board walls.
  3. New wood doors (natural finish to match existing doors in the building)..
  4. Hollow metal door frames.
  5. Exposed electrical conduit and mechanical piping.
  6. Other exposed ferrous and galvanized metals.

1.02 Related Sections:
- A. Caulking and Sealants (SECTION 079200).
- B. Gypsum Dry Wall (SECTION 092500).

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.
- D. Wood fascia, soffits, and trim:
  Lead free oil base gloss finish over primer:
  1st coat: Primer undercoat, TT-P-25.
  2nd coat: Exterior oil paint, TT-P-105.
  3rd coatg: Exterior oil paint, TT-P-106.
  Not less than 3.50 mils dry film thickness.

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. Masonry walls:
  Semi-gloss enamel finish (verify to match existing surfaces).
  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.

DIVISION 09. FINISHES

SECTION 099000 PAINTING (CONTINUED)

D. Gypsum board (semi-gloss alkyd, odorless finish, provide where not otherwise specified):
1st coat: Interior latex primer, TT-P-650.
2nd coat: Interior latex egg-shell enamel, TT-E-509.
3rd coat: Interior latex egg-shell enamel, TT-E-509.
Not less than 2.50 mils dry film thickness.

E. 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.

F. 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.

G. Natural finished woodwork:
1st coat: Interior oil stain, TT-S-711.
2nd coat: Bleached shellac, TT-S-300.
3rd coat: Rubbing varnish, TT-V-86.
4th coat: Rubbing varnish, TT-V-86.
Fill open grained wood with filler complying with TT-F-336 and wipe before first varnish coat. Door stain color and finish to match existing wood doors in the building or as approved.

PART 3 - EXECUTION

3.01 Number of paint colors:
Approximately 5.

3.02 Store materials in space designated and protect space from damage.
A. Keep paints covered at all times, protect form 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 cemetitious 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. Wood:
1. Clean wood surfaces to be painted of all dirt, oil, or other foreign substances.
2. Scrape off loose paint, and if necessary, lightly sand and dust off existing woodwork exposed to view to insure adhesion.
3. Scrape and clean small, dry seasoned knots on new wood and apply a thin coat

DIVISION 09. FINISHES

SECTION 099000 PAINTING (CONTINUED)

of white shellac or other recommended knot sealer before application of primer coat.

4. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sand smooth when dried.
5. Prime, stain, or seal wood required to be job painted immediately upon delivery to job.
6. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, trim, etc.
7. When transparent finish is required, use spar varnish for backpriming.
8. Seal tops, bottoms, and cut-offs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.

C. 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.

D. 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.

E. 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 flat, non-specular black paint.
10. Natural finishes:
    A. Rub thoroughly with 00 steel wool removing all hair grain and leaving perfectly smooth surface.
    B. Rub thoroughly between each coat with 6/0 steel wool.
    C. Apply wood filler / conditioner to soft woods and assemblies consisting of different species of woods.
    D. After thirty minutes apply first coat of stain with brush or cloth.
    E. Allow to penetrate wood five to fifteen minutes and wipe off with cloth and allow to dry over night (eight hours minimum).
    F. Repeat for second stain coat.
    G. After twenty four hours apply satin polyurethane finish, or sanding sealer, unless other finish (oil or wax) is specified, in which case, follow manufacturer's application instructions for these products.
    H. Allow to dry over night and apply second coat of polyurethane over first

DIVISION 09. FINISHES

SECTION 099000 PAINTING (CONTINUED)

coat.

I. Prepare samples of natural finish for approval prior to commencement of work.

11. Cleaning up:
Remove paint from fixtures, glass, furniture, fittings, etc.

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

DIVISION 10. SPECIALTIES

SECTION 101400 SIGNAGE AND GRAPHICS

PART 1 - GENERAL

1.01 Work Included:
- A. Toilet identification signs.
- B. Installation.
- C. Shop drawings.

1.02 Related Sections:
Toilet & Bath Accessories (SECTION 102813).

1.03 Submittals:
Submit under provisions of Section 013323.

PART 2 - PRODUCTS

2.01 Toilet identification signs.
- A. Refer to the drawings for size and design.
- B. Melamine plastic, matt finish, 1/8 inch thick.
- C. Attachment by pressure tape and two round head screws.
- D. Nominally 8" square.
- E. Dark background, with international handicapped symbol.
- F. Raised white letters “MEN” or “WOMEN”, minimum 1" high, raised minimum 1/32" above background surface of the sign.
- G. Letters to be accompanied with Grade 2 braille letters.

2.02 Manufactured in conformance with requirements of the North Carolina State Building Code, the Americans with Disability Act, and ICC A117.1-latest edition.

PART 3 - EXECUTION

3.01 Toilet identification signs.
- A. Signs to be mounted to the wall on the side of the entrances to the toilets, unless otherwise noted.
- B. Install 4" from the opening with the center of the sign in all cases 60 inches from the finished floor to the center of the sign.
- C. Mount level and true.

End of Section

DIVISION 10. SPECIALTIES

SECTION 102113 TOILET COMPARTMENTS

PART 1 - GENERAL

1.01 Work Included:
- A. Solid phenolic core toilet compartments.
- B. Hardware and finishes.

1.02 Related Sections:
Toilet & Bath Accessories (SECTION 102813).

1.03 References:
- A. ANSI/ICC A117.1 - Accessible and Usable Buildings and Facilities.
- B. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. NEMA LD 3 - High Pressure Decorative Laminates.

1.04 Shop Drawings and Submittals.
- A. Submit under provisions of Section 013323.
- B. Product Data: Manufacturer's product data for materials, fabrication, and installation including catalog cuts of anchors, hardware, fastenings, and accessories., including:
  1. Preparation instructions and recommendations.
  2. Storage and handling requirements and recommendations.
  3. Installation methods.
- C. Shop Drawings:
  1. Provide shop drawings for fabrication and installation of compartment assemblies that are not fully described by architectural drawings.
  2. Provide scale layout plan of compartments to be provided based upon actual field measurements.
  3. Provide template layouts and installation instructions for anchorage devices built into other work.
- D. Selection Samples:
  For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns. Submit manufacturer's standard color selector.
- E. Verification Samples: For each finish product selected, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Product Warranties.

1.05 Quality Assurance:
- A. Manufacturer Qualifications: Minimum 5 years manufacturing toilet partitions.
- B. Installer Qualifications: Minimum 2 years experience installing toilet partitions.
- C. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

1.06 Delivery, Storage, and Handling:
- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 Project Conditions:
- A. 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. Manufacturers storage and handling instruction shall be reviewed and maintained.
- B. Field Measurements: Take field measurements prior to component fabrication to ensure

DIVISION 10. SPECIALTIES

SECTION 102113 TOILET COMPARTMENTS (CONTINUED)

proper fitting of work.

C. Coordination: Furnish inserts and anchorages that will be built into other work for installation of toilet compartments and related items.

1.08 Warranty:

Manufacturer shall warrant the products installed under this section to be free of defects in materials or workmanship under normal usage from the date of substantial completion for a minimum period of twenty-five (25) years for panels, doors, and stiles against delamination, breakage, corrosion, or defects in factory workmanship. Manufacturer's standard 1 year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

PART 2 - PRODUCTS

2.01 As manufactured by one of the following:

A. Bobrick 1182 Duraline Series.
B. Ampco Products, Inc. Solid Phenolic Core.
C. ASI Accurate Partitions Phenolic - Black Core.
D. Approved equal.

2.02 Construction:

A. General:

Doors, panels, screens, and pilasters assembled into complete compartment system, with cutouts and drilled holes to receive hardware as indicated; processed and fabricated in a craftsmanlike manner; complying with ANSI/ICC A117.1, Americans with Disabilities Act (ADA), capable of supporting imposed superimposed loads from attached handicapped grab bars, and as follows:

B. Toilet Compartments: Overhead braced.
   1. Compartment Depth and Width: As indicated on drawings.
   2. Door Width: 24 inches (610 mm), minimum; at wheelchair accessible compartments, 32 inches (813 mm), inside clear minimum or as indicated on the drawings.
   3. Doors and Panels:
      A. Top at 70 inches (1778 mm) above finished floor.
      B. Bottom at 12 inches (305 mm) above finished floor.
      C. Pilaster Width: As required to fit space; minimum 3 inches (76 mm).
      D. Pilaster Height: 82 inches (2083 mm) including head rail.

C. Urinal Screens:
   1. Style: Wall mounted.
   2. Depth: 18 inches (457 mm).
   3. Height: Top at 60 inches (1778 mm) and bottom at 12 inches (305 mm) above finished floor.

2.03 Solid Phenolic Core Panel Components:

A. Doors, Panels, and Pilasters: Solid phenolic core with one piece melamine sheets bonded to phenolic resin impregnated Kraft sheets; exposed edge components polished black, chamfered and free of milling marks.
   1. Material:
      A. National Fire Protection Association/International Building Code Interior Wall and Ceiling Finish: Class A / Uniform Building Code: Class I.
      B. Flame Spread Index (ASTM E 84): 15 for panels and stiles.
      C. Smoke Developed Index (ASTM E 84): 25 for panels, 20 for stiles.

DIVISION 10. SPECIALTIES

SECTION 102113 TOILET COMPARTMENTS (CONTINUED)

2. Color:
   To be selected from manufacturer's standard colors or as noted on the drawings.
3. Edges: Polished black.
4. Thickness: Doors and Pilasters, 3/4 inch (19 mm); Panels and Urinal Screens, 1/2 inch (12 mm) minimum.

B. Fabrication:
1. Furnish standard doors, panels, screens and stiles fabricated for compartment system. Furnish units with cutouts and drilled holes to receive compartment hardware as indicated.
2. One-piece melamine face sheets are bonded under heat and high pressure to phenolic resin impregnated kraft sheets. All exposed edge components shall be polished black, chamfered and free of milling marks. Material shall meet Class B fire rating.

C. Hardware Set - Stainless Steel:
1. Brackets:
   Type 304 stamped stainless steel with number 4 satin finish.
2. Hinges:
   Cast Type 304 stainless steel with number 4 finish with gravity acting cam allowing doors to be set at various positions.
3. Latch and Keeper:
   Type 304 cast stainless steel with Number 4 finish; slide latch with combination stop and emergency release feature.
4. Coat Hook:
   Type 304 cast stainless steel with Number 4 finish; combination hook and bumper on inswinging doors.
5. Door Pull:
   Type 304 cast stainless steel with Number 4 finish.

2.03 Accessory Materials:
A. Pilaster Shoes, and Caps: 20 gage (0.9 mm) thick ASTM A 167, Type 304 stainless steel; not less than 3 inches (76 mm) high; Number 4 satin (brushed) finish.
B. Overhead Bracing: Continuous extruded aluminum, anti-grip profile, with clear satin anodized finish, with returns and anchors.
C. Anchorages and Fasteners: Manufacturer's standard chromium-plated exposed fasteners finished to match hardware with theft-resistant type heads (one-way).
1. Concealed Steel Fasteners: Zinc-plated, rust-resistant, protective coating.
2. Overhead Braced: Galvanized steel supports and leveling bolts at pilasters to suit floor conditions as recommended by manufacturer; provisions for setting and securing overhead bracing at top of each pilaster; pilaster shoe to conceal supports and leveling mechanism.

PART 3 EXECUTION

3.01 Examination:
A. Do not begin installation until substrates have been properly prepared.
B. 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

DIVISION 10. SPECIALTIES

SECTION 102113 TOILET COMPARTMENTS (CONTINUED)

3.03 Installation:

A. General:

1. Install in accordance with the approved shop drawings and the manufacturer's printed instructions.
2. Install compartment units rigid, straight, plumb and level.
3. Provide clearance of not more than 1/2 inch (12 mm) between stiles and panels and not more than 1 inch (25 mm) between panels and walls.
4. Secure panels to walls with not less than two brackets attached near top and bottom of panel.
5. Locate wall brackets so holes for wall anchorages occur in masonry or tile joints.
6. Secure panels to stiles with not less than two brackets located to align with brackets at wall.
7. Secure panels in position with manufacturer's recommended anchoring devices.
8. Level, plumb, and tighten installation with devices furnished.
9. Coordinate with installation of toilet accessories.

B. Overhead Braced Compartments:

1. Secure stile to floor.
2. Secure overhead brace to each stile with fasteners supplied.
3. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens:

1. Attach with anchoring devices as recommended by manufacturer to suit supporting structure.
2. Set unit to provide support and to resist lateral impact.

3.04 Adjusting and Cleaning:

A. Hardware Adjustment:

Adjust and lubricate hardware for proper operation. Set hinges on in-swing doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges on out-swing doors (and entrance swing doors) to return to fully closed position.

B. Clean and Protect:

Clean exposed surfaces of compartment systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

End of Section

DIVISION 10. SPECIALTIES

SECTION 102813 TOILET ACCESSORIES

PART 1 - GENERAL

1.01 Work Included:
- A. Toilet grab bars (one sidewall, one rear wall, one vertical grab bar per each handicapped accessible water closet stall).
- B. Toilet tissue holders (one per water closet).
- C. Soap dispensers (one per lavatory).
- D. Framed mirrors (one per lavatory).
- E. Recessed waste receptacle (one per toilet).
- F. Paper towel dispensers to be provided by the Owner and installed by the General Contractor.

1.02 Submittals:
- A. Submit under provisions of Section 013323.
- B. Provide manufacturer's product literature for each product specified and used on the project.

PART 2 - PRODUCTS

2.01 By Bobrick Washroom Equipment, Inc.; Bradley Corporation; American Specialities, Inc., or approved equal.

2.02 Construction:
- A. Stainless steel: All accessories to be fabricated of AISI type 302 / 304 stainless steel construction.
- B. Brass: Leaded and unleaded, flat products, FS QQ-B-613; rods, shapes, forgings, and flat products with finished edges, FS QQ-B-626.
- C. Sheet steel: Cold rolled, commercial quality ASTM A 366, 20 gauge minimum, unless otherwise indicated; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized steel sheet: ASTM A 527, G60.
- E. Chromium plating: Nickel / chromium electro-deposited on base metal, ASTM B 456, SC 2.
- F. Galvanized steel mounting devices: ASTM A 386, hot-dip galvanized after fabrication.
- G. Fasteners: Screws, bolts, and/or other devices of the same material as accessory unit or of galvanized steel where concealed.
- H. Stamped names / labels on exposed faces are not permitted, unless otherwise indicated; where locks are required for particular type, provide same keying throughout project. Furnish 2 keys each lock.
- I. Unless otherwise indicated, fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

2.03 Fixtures:
- A. Toilet grab bars:
  1. Sidewall grab bars: Bobrick B-6806, 42" long; Bradley model 812, 42" long; ASI 3201 series, 42" long.
  2. Rear wall grab bars: Bobrick B-6806, 36" long; Bradley model 812, 36" long; ASI 3201 series, 36" long.
  3. Vertical grab bars: Bobrick B-6806, 16" long; Bradley model 812, 18" long; ASI 3201 series, 18" long.

DIVISION 10. SPECIALTIES

SECTION 102813 TOILET ACCESSORIES (CONTINUED)

3. All grab bars 1.1/2" diameter, 18 gauge, type 304 satin finish stainless steel with concealed mounting flanges and safety statue clearance.

B. Toilet tissue holders: Bobrick B-6857; Bradley model 5084; ASI 7305S.
C. Soap dispensers: Bobrick B-2111, or equal by Bradley, ASI.
D. Framed mirrors: Bobrick B-290 1830; Bradley model 700-18x30; ASI 0600-A 18x30
E. Recessed waste receptacle: Bobrick B-3644, or equal by Bradley, ASI.
F. Paper towel dispenser as furnished and supplied by the Owner.

PART 3 - EXECUTION

3.01 Set accessories solidly, plumb and true. All exposed screws shall be of the same material and finish as the accessory. Expansion shields shall not be used; toggle bolts are required.
3.02 Clean and polish fixtures and leave in perfect condition.
3.03 Units shall be theft-proof mounted using manufacturer's standard mounting kits.
3.04 Mounting kits shall be provided by the manufacturer of the accessory.
3.05 Mounting heights to accommodate NC State Building Code and ADA acceptable height limitations.

End of Section

SECTION 22 05 00 - BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Basic Plumbing Requirements specifically applicable to Division 22 Sections, in addition to Division 1, General Requirements. The following are included in this Section to expand the requirements specified in Division 1.
   1. Submittals.
   2. Regulatory requirements.
   3. Project/site conditions.
   4. Sequencing and scheduling.
   5. Record documents.
   6. Maintenance manuals.
   7. Plumbing installation.
   8. Cutting and patching.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 SUBMITTALS

A. Submit under provisions of Section 013300 Submittal Procedures.

B. Increase the number of plumbing related product data, samples, and shop drawings required for your distribution by three copies of each submittal. The owner, architect and engineer will each retain a copy of every submittal.

C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

D. Mark dimensions and values in units to match those specified.

1.3 REGULATORY REQUIREMENTS

A. Plumbing: Conform to North Carolina State Building Code.

B. Obtain permits, and request inspections from authority having jurisdiction.

1.4 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer and Owner before proceeding.

1.5 SEQUENCING AND SCHEDULING

A. Construct Work in sequence under provisions of Section 013100.

1.6 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1, Section 017839 Project Record Documents. In addition to the requirements specified in Division 1, indicate the following as-built conditions:
   1. Size and location of all piping systems with valves and control devices located and numbered, location of all concealed unions, and other piping accessories requiring maintenance (i.e.., tanks, expansion joints, strainers, etc.). Underground piping's actual locations shall be dimensioned from building columns and actual inverts shall be indicated on the as-built drawings.
   2. Valve location diagrams, complete with valve tag chart, refer to Section 220553, "Plumbing Identification".
   3. Equipment locations dimensioned from building columns.
   4. Contract modifications, including actual equipment and materials installed.

1.7 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with the requirements in Division 1, Section 017823 Operation and Maintenance Data. In addition to the requirements specified in Division 1, include the following information for equipment items:
   1. Description of function, normal operating characteristics and limitations, performance curves, engineering data, complete diagrams and part numbers of replacement parts.
   2. Manufacturer's printed operating and maintenance manuals including startup and break-in procedures, control, regulation, shutdown, and emergency instructions, routine and normal operating instructions, and summer and winter operating instructions.
   3. Service procedures for preventative maintenance and troubleshooting including lubrication charts and schedules, and instructions for alignment, adjusting, disassembly, repair, and reassemby.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PLUMBING INSTALLATIONS

A. Coordinate plumbing systems, equipment, and material installation with other building systems.

B. Verify all dimensions by field measurement

C. Verify final locations for rough-ins with field measurements and with the actual equipment to be connected.

D. Coordinate the installation of the required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Install systems, equipment, materials which conform with approved submittals, including coordination drawings, to the greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work shown are only diagrammatic in form. Notify Architect where coordination requirements conflict with individual system requirements.

F. Where mounting heights are not given, install systems, and/or equipment to provide the maximum headroom possible.

G. Install systems, and equipment level and plumb, and parallel or perpendicular to other building systems.

H. Systems that are must be installed at a specific slope (e.g...., sanitary waste and vent, steam and condensate piping, etc…) shall have a right of way priority. Provide offsets in other systems as required to allow the priority systems to maintain a proper slope.

I. Arrange for chases, slots, and openings in other building components during progress of construction, as required to install plumbing systems, and equipment.

J. Install access doors or panels where equipment, dampers, or valves are concealed behind finished surfaces.

K. Coordinate connection of plumbing systems with exterior underground and overhead utilities. Comply with requirements of the governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

L. Install plumbing equipment to facilitate servicing, maintenance, and repair, or replacement, of all equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum interference to other installations.

3.2 CUTTING AND PATCHING

A. Remove from site and legally dispose of, unless specifically noted to be turned over to the owner, all material which your workman cut, and/or demolished in the course of completing the project.

B. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Repair any damage to existing, and/or newly added, building systems occurring as a result of cutting and patching operations of your workman.

C. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

D. Existing surfaces and building components shall be patched using new materials to match existing materials by workmen experienced in installing the building component being patched.

E. Perform cutting and patching of plumbing equipment and materials required to:
1. Uncover work to provide for ill-timed work.
2. Remove and replace defective work, and work not conforming to the requirements of the Contract Documents.
3. Install new equipment and materials in existing structures.
4. Remove samples of installed work as specified for testing.

5. Upon written instructions from the Architect/ Engineer, uncover and restore work to provide for the observation of concealed work by the Architect/Engineer.

End of Section

SECTION 220553 - PLUMBING IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Nameplates.
2. Tags.
3. Pipe markers.
4. Stickers.

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

1.2 REFERENCES

A. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

A. Submit under provisions of Division 1, Section 013300 Submittal Procedures.

B. Submit list of wording, symbols, letter size, and color coding for plumbing identification.

C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D. Product Data: Provide manufacturers catalog literature for each product required.

E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.

1.4 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division 1, Section 017839 Project Record Documents.

B. Record actual locations of tagged valves and submit valve tag chart.

PART 2 PRODUCTS

2.1 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved white letters on dark contrasting background color.

2.2 TAGS

A. Plastic Tags: Laminated three-layer plastic with engraved white letters on dark contrasting background color. Tag size minimum 3/4 x 1-1/2 inch.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

C. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 PIPE MARKERS

A. Color: Conform to ASME A13.1.

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

2.5 STICKERS

A. Description: 1" (25 mm) diameter round glossy paper stickers with adhesive backing, color coded head.

B. Color code as follows:

1. Green - Plumbing valves

PART 3 EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

A. Install plastic nameplates with corrosive-resistant plumbing fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosion resistant chain.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Identify water heaters, pumps, sumps, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

E. Identify control panels and major control components outside panels with plastic nameplates.

F. Identify all valves with numbered tags.

G. Tag automatic controls, instruments, and relays. Key to control schematic.

H. Identify piping, concealed or exposed, with plastic tape pipe markers. 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.

I. Provide stickers attached to ceiling to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to valve.

End of Section

SECTION 220700 - PLUMBING INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:
1. Glass fiber.
2. Jackets.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

PART 2 PRODUCTS

2.1 GLASS FIBER

A. Manufacturers:
1. Product shall be manufactured by one of the following acceptable manufacturers.
a. Certainteed Fiberglass Corp.
b. Owens Corning Fiberglas Corp..
c. Schuller International, Inc..
d. Knauf Fiber Glass GmbH..

B. Insulation: ASTM C547; rigid molded, noncombustible.
1. 'K' value : ASTM C335, 0.24 at 75 degrees F (0.035 at 24 degrees C).
2. Minimum Service Temperature: -20 degrees F (-28.9 degrees C).
3. Maximum Service Temperature: 450 degrees F (232 degrees C).
4. Maximum Moisture Absorption: 0.2 percent by volume.

C. Vapor Barrier Jacket
1. White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
3. Secure with self sealing longitudinal laps and butt strips.
4. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Vapor Barrier Lap Adhesive
1. Manufacturers:
a. Childers Model CP-30.
b. Fosters.
c. Cimasco.
2. Compatible with insulation.

2.3 JACKETS

A. PVC Plastic: Jacket: One piece molded type fitting covers and sheet material, off white color.
1. Minimum Service Temperature: -40 degrees F (-40 degrees C).
2. Maximum Service Temperature: 150 degrees F (66 degrees C).
3. Moisture Vapor Transmission: ASTM E96; 0.002 perm inches.
4. Maximum Flame Spread: ASTM E84; 25.

5. Maximum Smoke Developed: ASTM E84; 50.
6. Thickness: 15 mil.
7. Connections: Pressure sensitive color matching vinyl tape.
8. Covering Adhesive: Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

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. Finish with glass cloth and vapor barrier adhesive.
4. PVC fitting covers may be used.
5. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations.
6. 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 (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

E. Inserts and Shields:
1. Application: Piping 1-1/2 inches (40 mm) 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 (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
5. Insert Material: ASTM C640 cork, 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 piping concealed above ceilings insulate with glass fiber insulation and finish with all service paper jacket.

3.3 TOLERANCE

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

3.4 GLASS FIBER INSULATION SCHEDULE

PIPING SYSTEMS	PIPE SIZE	THICKNESS
	Inch (mm)	Inch (mm)
A. Plumbing Systems		
Domestic Hot Water Supply (under 140)	1/2” (13) to 2” (51)	1” (25)
Domestic Cold Water	1/2” (13) to 2” (51)	1” (25)
Plumbing Vents (Within 6 feet of exterior)	1-1/2”(38) to 4” (102)	1” (25)

End of Section

SECTION 221100 FACILITY WATER DISTRIBUTION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Domestic water piping, above grade.
   2. Unions and flanges.
   3. Valves.
   4. Pipe hangers and supports.
   5. Hose bibs.
   6. Hydrants.

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary, 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.

1.2 REFERENCES

A. American National Standards Institute:
   1. ANSI Z21.22 - Relief Valves for Hot Water Supply Systems.

B. American Society of Mechanical Engineers:
   1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
   2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
   3. ASME B31.9 - Building Services Piping.

C. American Society of Sanitary Engineering:
   1. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.
   2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers.
   3. ASSE 1019 - Performance Requirements for Vacuum Breaker Wall Hydrants, Freeze Resistant, Automatic Draining Type.
   4. ASSE 5013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers (RP) and Reduced Pressure Fire Protection Principle Backflow Preventers (RFP).

D. ASTM International:
   1. ASTM B32 - Standard Specification for Solder Metal.
   2. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
   3. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
   4. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
   5. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
   6. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
   7. ASTM D2661 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings.

8. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
9. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

E. American Welding Society:
   1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:
   1. MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
   2. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
   3. MSS SP 85 - Cast Iron Globe & Angle Valves, Flanged and Threaded.
   4. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

G. National Electrical Manufacturers Association:
   1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

H. Plumbing and Drainage Institute:
   1. PDI WH201 - Water Hammer Arrester Standard.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturer's catalog information.
   2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
   3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
   4. Domestic Water Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

C. Manufacturer's Installation Instructions: Submit installation instructions for pumps, valves and accessories.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 0177 00 - Closeout Procedures.

B. Project Record Documents: Record actual locations of valves and equipment.

C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views and recommended maintenance intervals.

1.5 QUALITY ASSURANCE

A. For drinking water service, provide valves complying with NSF 61.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.

B. Accept valves and equipment on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Section 016000 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.10 EXTRA MATERIALS

A. Section 017000 - Closeout Procedures: Spare parts and maintenance products.

B. Furnish two packing kits for each size valve, and two loose keys for outside hose bibs.

PART 2 PRODUCTS

2.1 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tubing: ASTM B88, Type L drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead free solder.

2.2 UNIONS AND FLANGES

A. Unions for Pipe 2 inches (50 mm) and Smaller:

1. Copper Piping: Class 150, bronze unions with [soldered] [brazed joints].
2. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.3 BALL VALVES

A. Manufacturers:
   1. Apollo Model 70-100 Series.
   2. NIBCO, Inc. Model T-580-70.
   3. Watts Model B-6000.
   4. Substitutions: Section 016000 - Product Requirements.

B. 2 inches (50 mm) and Smaller: MSS SP 110, 600 psi (4140 kPa) WOG, two piece bronze body, chrome plated brass ball, full port, teflon seats, blow-out proof stem, threaded ends with union, lever handle.

2.4 CHECK VALVES

A. Horizontal Swing Check Valves:
   1. Manufacturers:
      a. Crane Valve, North America Model 37.
      b. Jenkins Model 4037J.
      c. NIBCO, Inc. Model T-413.
      d. Substitutions: Section 016000 - Product Requirements.
   2. 2 inches (50 mm) and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, threaded ends.

2.5 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. B Line Systems, Incorporated.
   2. Grinnell Corp.
   3. Michigan Hanger Co.
   4. Substitutions: Section 016000 - Product Requirements.

B. Plumbing Piping: Conform to ASME B31.9 and ASTM F708.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Carbon steel, adjustable swivel, split ring.

D. Hangers for Cold Pipe Sizes 2 inches (50 mm) and Larger: Carbon steel, adjustable, clevis.

E. Hangers for Hot Pipe, Sizes 2 to 4 inches (50 to 100 mm): Carbon steel, adjustable, clevis.

F. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.

G. Wall Support for Pipe Sizes 3 inches (80 mm) and Smaller: Cast iron hooks.

H. Wall Support for Pipe Sizes 4 inches (100 mm) and Larger: Welded steel bracket and wrought steel clamps.

I. Copper Pipe Support: Carbon steel ring, adjustable, copper plate.

2.6 HOSE BIBS

A. Interior: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with lock shield and removable key, vacuum breaker in conformance with ASSE 1011, equivalent to Woodford 24C.

B. Rough-in with 1/2” brass nipple protruding thru face of wall or partition.

2.7 HYDRANTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company.
   2. Josam Company.
   3. WCM Industries, Inc.
   4. Zurn Industries, LLC.
   5. Substitutions: Section 016000 - Product Requirements.

B. Wall Hydrant: ASSE 1019; non-freeze, self-draining type with polished bronze wall plate, hose thread spout, locks shield and removable key, and integral vacuum breaker equivalent to Woodford 65.

2.8 WATER HAMMER ARRESTORS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company.
   2. Josam Company.
   3. Zurn Industries, LLC.
   4. Substitutions: Section 016000 - Product Requirements.

B. ASSE 1010; stainless steel construction, bellows type sized in accordance with PDI WH-201.

C. Pre-charged suitable for operation in temperature range 34 to 250 degrees F (1 to 120 degrees C) and maximum 150 psi (1000 kPa) working pressure.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 013100 – Project Management and Coordination: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Inserts:
   1. Provide inserts for placement in concrete forms.

2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches (100 mm) and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

B. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9 or ASTM F708.
2. Support horizontal piping as schedule.
3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.
7. Provide copper plated hangers and supports for copper.
8. Prime coat exposed steel hangers and supports. Refer to Section 099123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Install non-conducting dielectric connections wherever jointing dissimilar metals.

B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

C. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

D. Group piping whenever practical at common elevations.

E. Slope piping and arrange systems to drain at low points.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 083113.

I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

J. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 099123.

K. Install domestic water piping in accordance with ASME B31.9.

L. Sleeve pipes passing through partitions, walls and floors.

M. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

N. Install unions downstream of valves and at equipment or apparatus connections.

O. Install valves with stems upright or horizontal, not inverted.

P. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

Q. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

R. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatories, sinks and flushing fixtures.

S. Install water hammer arrestors on hot and cold water supply piping to each fixture or group of fixtures (each washroom).

3.5 CLEANING

A. Section 017700 - Closeout Procedures: Requirements for cleaning.

B. Prior to starting work, verify system is complete, flushed and clean.

C. Verify pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

D. Inject disinfectant, free chlorine in liquid, powder and tablet or gas form, throughout system to obtain residual from 50 to 80 mg/L.

E. Bleed water from outlets to obtain distribution and test for disinfectant residual at minimum 15 percent of outlets.

F. Maintain disinfectant in system for 24 hours.

G. When final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual concentration is equal to incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.6 SCHEDULES

A. Pipe Hanger Spacing:

PIPE MATERIAL	MAXIMUM HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
Copper Tube, 1-1/4 inches (32 mm) and smaller	6 (1.8)	1/2 (13)
Copper Tube, 1-1/2 inches (38 mm) and larger	10 (3)	1/2 (13)

End of Section

SECTION 221300 FACILITY SANITARY SEWERAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sanitary sewer piping buried within 5 feet (1500 mm) of building.
   2. Sanitary sewer piping above grade.
   3. Pipe hangers and supports.
   4. Floor drains.
   5. Cleanouts.
   6. Bedding and cover materials.

B. Related Documents: The Contract Documents, as defined in Section 011000 - Summary, 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.

1.2 REFERENCES

A. American Society of Mechanical Engineers:
   1. ASME A112.21.1 - Floor Drains.

B. ASTM International:
   1. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
   2. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
   3. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
   4. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
   5. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

1.3 SUBMITTALS

A. Section 013000 - Submittal Procedures: Submittal procedures.

B. Product Data:
   1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
   2. Hangers and Supports: Submit manufacturers catalog information including load capacity.
   3. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 017700 - Closeout Procedures: Closeout procedures.

B. Project Record Documents: Record actual locations of equipment and clean-outs.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements: Product storage and handling requirements.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 0160 0 - Product Requirements.

B. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 mm) OF BUILDING

A. PVC Pipe: ASTM D1785, Schedule 40, solid core polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joint ends.
   1. Fittings: ASTM D2466, Schedule 40, PVC .
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

A. PVC Pipe: ASTM D1785 Schedule 40, 150 psi (1034 kPa) pressure rating, solid core polyvinyl chloride (PVC) material.
   1. Fittings: ASTM D2466, Schedule 40, PVC.
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 Solvent cement.

2.3 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
   1. B Line Systems, Incorporated.
   2. Grinnell Corp.
   3. Michigan Hanger Co.
   4. Substitutions: Section 016000 - Product Requirements.

B. Drain, Waste, and Vent: Conform to ASTM F708.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Carbon steel, adjustable swivel, split ring.

D. Hangers for Pipe Sizes 2 inches (50 mm) and Larger: Carbon steel, adjustable, clevis.

E. Wall Support for Pipe Sizes 3 inches (80 mm) and Smaller: Cast iron hooks.

F. Wall Support for Pipe Sizes 3 inches (100 mm) and Larger: Welded steel bracket and wrought steel clamp.

2.4 FLOOR DRAINS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company.
   2. Josam Company.
   3. Zurn Industries, LLC.
   4. Substitutions: Section 016000 - Product Requirements.

B. Floor Drain (FD-1): ASME A112.21.1; lacquered cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.5 CLEANOUTS

A. Manufacturers:
   1. Jay R. Smith Manufacturing Company.
   2. Josam Company.
   3. Zurn Industries, LLC.
   4. Substitutions: Section 016000 - Product Requirements.

   B. Exterior Surfaced Areas (CO-1): Round cast nickel bronze access frame and non-skid cover.

C. Exterior Unsurfaced Areas (CO-2): Line type with lacquered cast iron body. Provide precast concrete donut around cleanout to protect cleanout from lawn mowers.

D. Interior Finished Floor Areas (CO-3): Lacquered cast iron body with anchor flange, threaded top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish in finished floor areas.

E. Interior Finished Wall Areas (CO-4): Line type with lacquered cast iron body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.

F. Interior Unfinished Accessible Areas (CO-5): Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.6 BEDDING AND COVER MATERIALS

A. Bedding: Fill Type as specified in Section 310220.

B. Cover: Fill Type as specified in Section 310220.

C. Soil Backfill from Above Pipe to Finish Grade: Soil Type as specified in Section 310220 , no rocks over 6 inches (150 mm) in diameter, frozen earth or foreign matter shall be used as backfill.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 013100 – Project Management and Coordination: Coordination and project conditions.

B. Verify excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Inserts:
1. Provide inserts for placement in concrete forms.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches (100 mm) and larger.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

B. Pipe Hangers and Supports:
1. Install in accordance with ASTM F708.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Prime coat exposed steel hangers and supports. Refer to Section 099123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection to existing piping system size, location, and invert are as indicated on drawings prior to beginning sanitary drainage piping. Report any problems to the Architect or Engineer.

B. Establish elevations of buried piping with not less than 1 ft (0.3 m) of cover.

C. Establish minimum separation of 5 ft.(1500 mm) from other services piping.

D. Remove scale and dirt on inside of piping before assembly.

E. Excavate pipe trench in accordance with Section 312020.

F. Install pipe to elevation as indicated on Drawings.

G. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches (100 mm) compacted depth; compact to 95 percent maximum density.

H. Install pipe on prepared bedding.

I. Route pipe in straight line.

J. Install trace wire continuous buried 6 inches (150 mm) below finish grade.

K. Pipe Cover and Backfilling:
   1. The owner must inspect all underground work before it is backfilled. Provide a minimum of 24 hours notice to owner's representative.
   2. Backfill trench in accordance with Section 310220.
   3. Maintain optimum moisture content of fill material to attain required compaction density.
   4. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches (150 mm) compacted layers to 12 inches (300 mm) minimum cover over top of jacket. Compact to 95 percent maximum density.
   5. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
   6. Do not use wheeled or tracked vehicles for tamping.

3.5 INSTALLATION - ABOVE GROUND PIPING

A. Establish invert elevations, slopes for drainage to 1/8 inch per foot (one percent) minimum. Maintain gradients.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.

C. Encase exterior cleanouts in paved areas with concrete flush with surrounding pavement.

D. Provide precast concrete donut around exterior cleanouts in unpaved areas such that top of concrete donut extends above the top of the cleanout by a minimum of 2 in. (50 mm).

E. Install floor cleanouts at elevation to accommodate finished floor.

F. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

G. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

H. Install piping to maintain headroom. Do not spread piping, conserve space.

I. Group piping whenever practical at common elevations.

J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation.

L. Install piping penetrating roofed areas to maintain integrity of roof assembly.

M. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

N. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 099123.

O. Sleeve pipes passing through partitions, walls and floors.

P. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

3.6 SCHEDULES

PIPE HANGER SPACING		
PIPE MATERIAL	MAXIMUM HANGER SPACING Feet (m)	HANGER ROD DIAMETER Inches (mm)
PVC (All Sizes)	4 (1.2)	3/8 (9)

End of Section

SECTION 224000 PLUMBING FIXTURES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Water Closets.
2. Urinals.
3. Lavatories.
4. Electric Water Coolers.
5. Service Sinks.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. ANSI/ASME A112.6.1 - Supports for Off-the-Floor Plumbing Fixtures for Public Use.

B. ASME A112.18.1 - Finished and Rough Brass Plumbing Fixture Fittings.

C. ANSI/ASME A112.19.1 - Enameled Cast Iron Plumbing Fixtures.

D. ANSI/ASME A112.19.2 - Vitreous China Plumbing Fixtures.

E. ANSI/ASME A112.19.6 - Trim for Water-Closet Bowls, Tanks, and Urinals (Dimensional Standards).

F. ANSI/ARI 1010 - Drinking-Fountains and Self-Contained, Mechanically-Refrigerated Drinking-Water Coolers.

1.3 SUBMITTALS

A. Submit under provisions of Division 1, Section 013300 Submittal Procedures.

B. Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

C. Manufacturer’s Installation Instructions.

1.4 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Section 017823 Operation and Maintenance Data.

B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 1, Section 016000 Product Requirements.

B. Accept fixtures on site in factory packaging. Inspect for damage.

C. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

B. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories and sinks.

1.7 WARRANTY

A. Provide five year warranty under provisions of Section 01780 Close out Submittals.

B. Warranty: Include coverage of electric water cooler compressor.

1.8 EXTRA MATERIALS

A. Furnish under provisions of Section 01780 Close out Submittals.

B. Provide two of flush valve service kits.

PART 2 PRODUCTS

2.1 WATER CLOSET (WC-1)

A. Bowl
1. Manufacturer: American Standard Model 2235.128US.
2. Other acceptable manufacturers offering equivalent products.
   a. Kohler Model K-3493.
   b. Toto CST-744EL.
3. ANSI/ASME A112.19.2M; floor mounted, 12” rough-in, Siphon jet, 16.5” high vitreous china closet bowl, with elongated rim, coupled closet combination with, insulated vitreous china closet tank with fittings and lever flushing valve, chrome plated bolt caps.

B. Seat
1. Manufacturer: Kohler Model K-4670-C.
2. Other acceptable manufacturers offering equivalent products.
   a. American Standard Model 0039.075.
3. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.2 WATER CLOSET (WC-2)

A. Bowl
1. Manufacturer: American Standard Model 2232.128US.
2. Other acceptable manufacturers offering equivalent products.
   a. Kohler Model K-3575.
   b. Toto CST-744EN.

3. ANSI/ASME A112.19.2M; floor mounted, 12” rough-in, Siphon jet, 15” high vitreous china closet bowl, with elongated rim, coupled closet combination with, insulated vitreous china closet tank with fittings and lever flushing valve, chrome plated bolt caps.

B. Seat
1. Manufacturer: Kohler Model K-4670-C.
2. Other acceptable manufacturers offering equivalent products.
   a. American Standard Model 0039.075.
3. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.3 URINAL (UR-1)

A. Urinal
1. Manufacturer: American Standard Model 6541.132.
2. Other acceptable manufacturers offering equivalent products.
   a. Kohler Model K-5016-T.
   b. Toto Model UE104E.
3. ANSI/ASME A112.19.2; vitreous china, wall hung siphon jet urinal with integral trap, 3/4 inch (19 mm) top spud, and steel supporting hanger.

B. Flush Valve
1. Manufacturer: Sloan Gem 2 Model 186-0.5 .
2. Other acceptable manufacturers offering equivalent products.
   a. Toto TMU1LN
   b. Zurn Model Z-6203-EWS.
3. ASME A112.19.6; exposed chrome plated, piston type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker; maximum 0.5 gpf flush volume.

2.4 LAVATORY (LV-1)

A. Basin
1. Manufacturer: American Standard Model 0356.015..
2. Other acceptable manufacturers offering equivalent products.
   a. Kohler Model K-2005.
3. ANSI/ASME A112.19.2; vitreous china wall-hung lavatory 21 x 18 inch (533 x 457 mm) nominal, with 4 inch (100 mm) high back, drillings on 4 inch (200 mm) centers, rectangular basin with splash lip, front overflow, soap depression, and concealed arm support.

B. Trim
1. Manufacturer: Moen 8884 with plate 99457.
2. Other acceptable manufacturers offering equivalent products.
   a. Cambridge Brass Model 86T1104 with 86T151 plate.
   b. Chicago Faucet Model 857-E2805-665PSHCP
3. ASME A112.18.1;chrome plated cast brass metering lavatory faucet with one ADA push button lever, .5 gpm vandal resistant aerator, , 4” (101 mm) spout, McGuire #155A grid strainer, chrome plated 17 gage (1.3 mm) brass P-trap with pre-wraped protective cover equivalent to McGuire #2125, angle wheel handle stops equivalent to McGuire #175 with 12” long 1/2” o.d. riser, 3/8” o.d. inlet. and escutcheons.

2.5 ELECTRIC WATER COOLER (EWC-1)

A. Fountain
   1. Manufacturer: The Oasis Corporation, Model.P8AMSL.
   2. Other acceptable manufacturers offering equivalent products.
      a. Elkay Manufacturing Company, Model EBFATL-8. .
      b. Haws Drinking Fountain Co., Model HWBFA8L.
   3. CABO/ANSI 1117.1; two level, handicapped surface mounted electric water cooler with stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, mounting bracket, refrigerated with integral air cooled condenser.
      a. Capacity: 8 gph (15 L/hr) of 50 degree F (10 degree C) water with 80 degree F (27 degree C) entering water and a room temperature of 90 degree F (32 degree C).
      b. Electrical: Maximum 1/4 hp (380 W) compressor, 1-1/2 foot (457 mm) cord and plug for connection to electric wiring system, including grounding connector.

2.6 SERVICE SINK (JS-1)

A. Bowl
   1. Manufacturer: Stern Williams Model CRS-2202-SB-2.
   2. Other acceptable manufacturers offering equivalent products.
      a. Florestone Products co. Model 99.
   3. 28 x 28 x 12 inch (600 x 600 x 300 mm) high white molded stone with radial front and front drop design with stainless steel cap on dropped front and stainless steel backsplash panels on two sides.

B. Trim
   1. Manufacturer: Cambridge Brass Model 28T9.
   2. Other acceptable manufacturers offing equivalent products.
      a. Chicago Faucet Model 897-RCF
      b. T&S Brass and Bronze Works, Inc. Model B-0655-BSTP
   3. ASME A112.18.1 exposed wall type supply with 4” lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
   4. Rough-in with 1/2” brass nipples protruding thru face of wall or partition.

C. Accessories
   1. 1. 5 feet (1.5m) of ½ inch (13 mm) diameter plain end reinforced rubber hose.
   2. Hose clamp hangers.
   3. Mop hanger.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

3.2 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install each fixture with trap, easily removable for servicing and cleaning.

C. Provide chrome plated rigid or flexible supplies to fixtures with angle stops, reducers, and escutcheons.

D. Install components level and plumb.

E. Install and secure fixtures in place with wall carriers and bolts.

F. Seal fixtures to wall and floor surfaces with sealant as specified in Section 079200, color to match fixture.

G. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

A. Adjust work under provisions of Section 017700.

B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.6 CLEANING

A. Clean work under provisions of 017700.

B. At completion clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 015000.

B. Do not permit use of fixtures.

3.8 FIXTURE HEIGHTS

A. Install fixtures to heights above finished floor as indicated.

B. Water-Closet
   1. Standard 15 inches (380 mm) to top of bowl rim.
   2. Handicapped 18 inches (455 mm) to top of seat.

C. Urinal
   1. Standard 22 inches (560 mm) to top of bowl rim.
   2. Handicapped 19 inches (485 mm) to top of bowl rim.

D. Lavatory
   1. Standard 31 inches (785 mm) to top of basin rim.
   2. Handicapped 34 inches (864 mm) to top of basin rim.

E. Drinking Fountain
   1. Standard 40 inches (1015 mm) to top of basin rim.
   2. Handicapped 36 inches (915mm) to top of basin rim.

3.9 FIXTURE ROUGH-IN SCHEDULE

	Hot Water	Cold Water	Waste	Vent
Lavatory:	1/2 inch (13 mm)	1/2 inch (13 mm)	1-1/2 inch (38 mm)	1-1/4 inch (32 mm)
Service Sink:	1/2 inch (13 mm)	1/2 inch (13 mm)	3 inch (75 mm)	1-1/2 inch (38 mm)
Drinking Fountain:		1/2 inch (13 mm)	1-1/4 inch (32 mm)	1-1/4 inch (32 mm)
Water Closet (Flush Valve):		1/2 inch (13 mm)	4 inch (100 mm)	2 inch (50 mm)
Urinal (Flush Valve):		3/4 inch (19 mm)	2 inch (50 mm)	1-1/2 inch (38 mm)

End of Section

SECTION 230500 - BASIC MECHANICAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to Division 1, General Requirements. The following are included in this section to expand the requirements specified in Division 1.
   1. Submittals.
   2. Regulatory requirements.
   3. Project/site conditions.
   4. Sequencing and scheduling.
   5. Record documents.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 SUBMITTALS

A. Submit under provisions of Division 1, Section 013300 Submittal Procedures.

B. Increase the number of mechanical related product data, samples, and shop drawings required for your distribution by three copies of each submittal. The owner, architect and engineer will each retain a copy of every submittal.

C. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

D. Mark dimensions and values in units to match those specified.

1.3 REGULATORY REQUIREMENTS

A. Conform to North Carolina State Building Code.

B. Obtain permits, and request inspections from authority having jurisdiction.

1.4 PROJECT/SITE CONDITIONS

A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.5 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1, Section 017839 Project Record Documents. In addition to the requirements specified in Division 1, indicate the following as-built conditions:

1. Size and location of all ductwork, locations of all filters, boxes, terminal units, dampers and other control devices requiring periodic maintenance and repair.
2. Size and location of all piping systems with valves and control devices located and numbered, location of all concealed unions, and other piping accessories requiring maintenance (i.e.., tanks, expansion joints, steam traps, strainers, etc.). Underground piping's actual locations shall be dimensioned from building columns and actual inverts shall be indicated on the as-built drawings.
3. Valve location diagrams, complete with valve tag chart, refer to Section 230553, "Mechanical Identification".
4. Equipment locations dimensioned from building columns.
5. Contract modifications, including actual equipment and materials installed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 MECHANICAL INSTALLATIONS

A. Coordinate mechanical systems, equipment, and material installation with other building systems.

B. Verify all dimensions by field measurement.

C. Verify final locations for rough-ins with field measurements and with the actual equipment to be connected.

D. Coordinate the installation of the required supporting devices and sleeves to be set in poured in place concrete and other structural components, as they are constructed.

E. Install systems, equipment, materials which conform with approved submittals, including coordination drawings, to the greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work shown are only diagrammatic in form. Notify Architect where coordination requirements conflict with individual system requirements.

F. Where mounting heights are not given, install systems, and/or equipment to provide the maximum headroom possible.

G. Install systems, and equipment level and plumb, and parallel or perpendicular to other building systems.

H. Systems that are must be installed at a specific slope (e.g...., sanitary waste and vent, steam and condensate piping, etc…) shall have a right of way priority. Provide offsets in other systems as required to allow the priority systems to maintain a proper slope.

I. Arrange for chases, slots, and openings in other building components during progress of construction, as required to install mechanical systems, and equipment.

J. Install access doors or panels where equipment, dampers, or valves are concealed behind finished surfaces.

K. Coordinate connection of mechanical systems with exterior underground and overhead utilities. Comply with requirements of the governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.

L. Install mechanical equipment to facilitate servicing, maintenance, and repair, or replacement, of all equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum interference to other installations.

3.2 CUTTING AND PATCHING

A. Remove from site and legally dispose of, unless specifically noted to be turned over to the owner, all material which your workman cut, and/or demolished in the course of completing the project.

B. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. Repair any damage to existing, and/or newly added, building systems occurring as a result of cutting and patching operations of your workman.

C. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

D. Existing surfaces and building components shall be patched using new materials to match existing materials by workmen experienced in installing the building component being patched.

E. Perform cutting and patching of mechanical equipment and materials required to:

1. Uncover work to provide for ill-timed work.
2. Remove and replace defective work, and work not conforming to the requirements of the Contract Documents.
3. Install new equipment and materials in existing structures.
4. Remove samples of installed work as specified for testing.
5. Upon written instructions from the Architect/ Engineer, uncover and restore work to provide for the observation of concealed work by the Architect/Engineer.

End of Section

SECTION 23 05 29 SUPPORTS AND ANCHORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe hangers and supports.
2. Accessories.
3. Inserts.
4. Flashing.
5. Equipment curbs.
6. Sleeves.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. ASME B31.9 - Building Services Piping

B. ASTM F708 - Design and Installation of Rigid Pipe Hangers.

1.3 SUBMITTALS

A. Submit under provisions of Division 1, Section 013300 Submittal Procedures.

B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

C. Product Data: Provide manufacturers catalog data including load capacity.

D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.

E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:
1. Pipe hangers and supports shall be manufactured by one of the following acceptable manufacturers:
a. B Line Systems, Inc.
b. Grinnell Corp.
c. Michigan Hanger Company.

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. Wall Support for Pipe Sizes to 3 Inches (75 mm): Cast iron hook.
4. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.2 ACCESSORIES

A. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.4 FLASHING

A. Metal Flashing: 26 gage (0.5 mm thick) galvanized steel.

B. Metal Counterflashing: 22 gage (0.8 mm thick) galvanized steel.

C. Caps: Steel, 22 gage (0.8 mm) minimum; 16 gage (1.5 mm) at fire resistant elements.

2.5 EQUIPMENT CURBS

A. Fabrication: Welded 18 gage (1.2 mm) galvanized steel shell and base, mitered 3 inch (75 mm) cant, 1-1/2 inch thick insulation, factory installed wood nailer.

2.6 SLEEVES

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 078446.

D. Sleeves for Round Ductwork: Galvanized steel.

E. Sleeves for Rectangular Ductwork: Galvanized steel or wood.

F. Firestopping Insulation: Glass fiber type, noncombustible, refer to Section 078446.

G. Sealant: Acrylic; refer to Section 079200.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.2 INSERTS

A. Provide inserts for placement in concrete formwork.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches (100 mm).

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

E. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.3 PIPE HANGERS AND SUPPORTS

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. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

F. Support riser piping independently of connected horizontal piping.

G. Provide copper plated hangers and supports for copper piping.

H. Design hangers for pipe movement without disengagement of supported pipe.

I. Prime coat exposed steel hangers and supports. Refer to Section 099123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.4 EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, minimum 4 inches (100 mm) thick and extending 6 inches (150 mm) beyond supported equipment. Refer to Section 033000.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.5 FLASHING

A. Provide flexible flashing and metal counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash pipes projecting 3 inches (75 mm) minimum above finished roof surface with lead worked one inch (25 mm) minimum into hub, 8 inches (200 mm) minimum clear on sides with 24 x 24 inches (600 x 600 mm) sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash, and seal.

C. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.

D. Provide curbs for mechanical roof installations 14 inches (350 mm) minimum high above roofing surface. Flash and counterflash with sheet metal; seal watertight. Attach counterflashing mechanical equipment and lap base flashing on roof curbs. Flatten and solder joints.

E. Adjust storm collars tight to pipe with bolts; caulk around top edge. Use storm collars above roof jacks. Screw vertical flange section to face of curb.

3.6 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

C. Extend sleeves through floors one inch (25 mm) above finished floor level. Caulk sleeves.

D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk,air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

E. Install chrome plated steel escutcheons at finished surfaces.

3.7 SCHEDULES

HANGER ROD

PIPE SIZE Inches (mm)	MAX. HANGER SPACING Feet (m)	DIAMETER Inches (mm)
1/2 to 1-1/4 (12 to 32)	6.5 (2)	3/8 (9)
1-1/2 to 2 (38 to 50)	10 (3)	3/8 (9)
2-1/2 to 3 (62 to 75)	10 (3)	1/2 (13)
4 to 6 (100 to 150)	10 (3)	5/8 (15)

End of Section

SECTION 230593 TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Submittals
2. Report Forms
3. Test and Balance Procedures.

B. Related Documents: The Contract Documents, as defined in Section 01110-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.

1.2 REFERENCES

A. AABC - National Standards for Field Measurement and Instrumentation, Total System Balance.

B. ASHRAE - 1984 Systems Handbook: Chapter 37, Testing, Adjusting and Balancing.

C. NEBB - Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.3 SUBMITTALS

A. Submit name of adjusting and balancing agency for approval within 30 days after award of Contract.

B. Prior to commencing work, submit draft reports indicating adjusting, balancing, and equipment data required.

C. Include detailed procedures, agenda, sample report forms, and copy of AABC National Project Performance Guaranty prior to commencing system balance.

D. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.

E. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.4 REPORT FORMS

A. Submit reports on AABC National Standards for Total System Balance or NEBB forms

B. Forms shall include the following information:
1. Title Page:
a. Company name
b. Company address

   c. Company telephone number
   d. Project name
   e. Project location
   f. Project Architect
   g. Project Engineer
   h. Project Contractor
   i. Project altitude
2. Instrument List:
   a. Instrument
   b. Manufacturer
   c. Model
   d. Serial number
   e. Range
   f. Calibration date
3. Air Moving Equipment:
   a. Location
   b. Manufacturer
   c. Model
   d. Air flow, specified and actual
   e. Return air flow, specified and actual
   f. Outside air flow, specified and actual
   g. Total static pressure (total external), specified and actual
   h. Inlet pressure
   i. Discharge pressure
   j. Fan RPM
4. Exhaust Fan Data:
   a. Location
   b. Manufacturer
   c. Model
   d. Air flow, specified and actual
   e. Total static pressure (total external), specified and actual
   f. Inlet pressure
   g. Discharge pressure
   h. Fan RPM
5. Return Air/Outside Air Data:
   a. Identification/location
   b. Design air flow
   c. Actual air flow
   d. Design return air flow
   e. Actual return air flow
   f. Design outside air flow
   g. Actual outside air flow
   h. Return air temperature
   i. Outside air temperature
   j. Required mixed air temperature
   k. Actual mixed air temperature
   l. Design outside/return air ratio
   m. Actual outside/return air ratio
6. Electric Motors:
   a. Manufacturer
   b. HP/BHP
   c. Phase, voltage, amperage; nameplate, actual, no load.
   d. RPM
   e. Service factor

f. Starter size, rating, heater elements

7. V-Belt Drive:
   a. Identification/location
   b. Required driven RPM
   c. Driven sheave, diameter and RPM
   d. Belt, size and quantity
   e. Motor sheave, diameter and RPM
   f. Center to center distance, maximum, minimum, and actual
8. Duct Traverse:
   a. System zone/branch
   b. Duct size
   c. Area
   d. Design velocity
   e. Design air flow
   f. Test velocity
   g. Test air flow
   h. Duct static pressure
   i. Air temperature
   j. Air correction factor
9. Air Distribution Test Sheet:
   a. Air terminal number
   b. Room number/location
   c. Terminal type
   d. Terminal size
   e. Area factor
   f. Design velocity
   g. Design air flow
   h. Test (final) velocity
   i. Test (final) air flow
   j. Percent of design air flow

1.5 PROJECT RECORD DOCUMENTS

A. Submit record documents under provisions of Division 1, Section 017839 Project Record Documents.

B. Accurately record actual locations of balancing valves and rough setting.

1.6 QUALITY ASSURANCE

A. Agency shall be company specializing in the adjusting and balancing of systems specified in this Section with minimum three years documented experience, and be certified by AABC or NEBB. Perform Work under supervision of AABC Certified Test and Balance Engineer, or a NEBB Certified Testing, Balancing and Adjusting Supervisor. Reports shall be sealed by a registered Professional Engineer.

B. Total system balance shall be performed in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance, ASHRAE - 1992 Systems Handbook, and NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.7 SEQUENCING AND SCHEDULING

A. Schedule work under the provisions of Section 013100.

B. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene a conference one week prior to commencing work of this Section, under provisions of Section 013100.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 EXAMINATION

A. Before commencing work, verify that systems are complete and operable. Ensure the following:
1. Equipment is operable and in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Correct fan rotation.
7. Fire and volume dampers are in place and open.
8. Coil fins have been cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.
11. Duct system leakage has been minimized.
12. Hydronic systems have been flushed, filled, and vented.
13. Proper strainer baskets are clean and in place.
14. Service and balance valves are open.

B. Report any defects or deficiencies noted during performance of services to Architect/Engineer.

C. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.

D. If, for design reasons, system cannot be properly balanced, report as soon as observed.

E. Beginning of work means acceptance of existing conditions.

3.2 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.3 INSTALLATION TOLERANCES

A. Adjust air handling systems to plus or minus 5 percent for supply systems and plus or minus 10 percent for return and exhaust systems from figures indicated.

B. Adjust hydronic systems to plus or minus 10 percent of design conditions indicated.

3.4 ADJUSTING

A. Adjust work under provisions of Section 016000.

B. Recorded data shall represent actually measured, or observed condition.

C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

F. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Owner.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels.

F. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

G. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

H. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

I. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

J. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

K. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.

End of Section

SECTION 230700 DUCTWORK INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Glass fiber, flexible.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. ASTM B209 - Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM C518 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

C. ASTM C553 - Mineral Fiber Blanket and Felt Insulation.

D. ASTM E84 - Surface Burning Characteristics of Building Materials.

E. ASTM E96 - Water Vapor Transmission of Materials.

F. NFPA 255 - Surface Burning Characteristics of Building Materials.

G. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

H. UL 723 - Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A. Submit under provisions of Division 1, Section 013300 Submittal Procedures.

B. Product Data: Provide product description, list of materials and thickness for each service, and locations.

C. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84.

B. Applicator: Company specializing in performing the work of this section with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 1, Section 016000 Product Requirements.

B. Deliver materials to site in original factory packaging, labeled with manufacturer's 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.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.1 GLASS FIBER, FLEXIBLE

A. Manufacturers:
1. Product shall be manufactured by one of the following acceptable manufacturers.
a. Owens Corning Fiberglas Corp..
b. Schuller International, Inc..
c. Knauf Fiber Glass GmbH..

B. Insulation: ASTM C553; flexible, noncombustible blanket.
1. 'K' ('Ksi') value : ASTM C518, 0.27 at 75 degrees F (0.039 at 24 degrees C).
2. Maximum service temperature: 250 degrees F (121 degrees C).
3. Maximum moisture absorption: 3.0 percent by volume.
4. Density: 1.0 lb/cu ft (16 kg/cu m).

C. Vapor Barrier Jacket
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film 0.0032 inch (0.081 mm) vinyl.
2. Moisture vapor transmission: ASTM E96; 0.02 perm.
3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that ductwork has been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Insulated ductwork conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Insulated ductwork conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

D. For ductwork exposed in mechanical equipment rooms and/or finished spaces, insulate with rigid glass fiber, finish with canvas jacket sized for finish painting.

E. Ductwork conveying pretreated outside air from the discharge of the air to air heat exchanger to the inlet of the heat pumps shall be insulated as “outside air intake ducts” as per insulation schedules below.

F. Ductwork conveying exhaust air from the space to the inlet of the air to air heat exchangers shall be insulated as “Exhaust duct” as per insulation schedules below.

3.3 TOLERANCE

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

3.4 FLEXIBLE GLASS FIBER DUCTWORK INSULATION SCHEDULE

DUCTWORK	THICKNESS Inch (mm)	FINISH
Exhaust Ducts Within 10 ft (3 m) of Exterior Openings	1 (25)	
Outside Air Intake Ducts	2 (50)	
Supply Ducts	2 (50)	
Return and Relief Ducts	1 (25)	

End of Section

SECTION 233000 DUCTWORK ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Volume Control Dampers.
2. Fire Dampers
3. Backdraft Dampers.
4. Flexible Duct Connectors.
5. Duct Access Doors.
6. Duct Test Holes.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

B. SMACNA - Low Pressure Duct Construction Standards.

C. UL 33 - Heat Responsive Links for Fire-Protection Service.

D. UL 555 - Fire Dampers and Ceiling Dampers.

1.3 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division 1, Section 013300 Submittal Procedures.

B. Submit manufacturer's installation instructions under provisions of Section 013300 , for fire dampers.

PART 2 PRODUCTS

2.1 VOLUME CONTROL DAMPERS.

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. Fabricate single blade dampers for duct sizes to 12 x 36 inch (300 x 900 mm).

C. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch (300 x 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

D. Except in round ductwork 12 inches (300 mm) and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

E. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

F. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.2 FIRE DAMPERS

A. Manufacturers:
1. Fire Dampers shall be manufactured by one of the following acceptable manufacturers:
a. Prefco Products, Inc..
b. Ruskin Mfg..
c. Safe Air/Dowco, Inc..
d. United Air; Division of Leader Industries Inc..

B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

C. Fabricate ceiling dampers of galvanized steel, 22 gage (0.76 mm) frame, stainless steel closure spring, and light weight, heat retardant non-asbestos fabric blanket closure.

D. Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream.

E. Fabricate multiple blade fire dampers with 16 gage (1.5 mm) galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x ½ inch (3.2 x 12.7 mm) plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

F. Fusible links, UL 33, shall separate at [60 degrees F (71 degrees C). Provide adjustable link straps for combination fire/balancing dampers.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:
1. Backdraft Dampers shall be manufactured by one of the following acceptable manufacturers:
a. American Warming & Ventilating, Inc..
b. Arrow United Industries.
c. Ruskin Mfg..
d. Safe Air/Dowco, Inc..

B. Gravity backdraft dampers, size 18 x 18 inches (457 x 457mm)] or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.

C. Fabricate multi-blade, parallel action gravity balanced backdraft dampers of 16 gage (1.5 mm) galvanized steel with [enter pivoted blades of maximum 6 inch (150 mm) width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.4 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 36 oz per sq yd (1.22 kg/sq m), approximately 6 inches (150 mm) wide, crimped into metal edging strip.

C. Leaded vinyl sheet, minimum 0.55 inch (14 mm) thick, 0.87 lbs per sq ft (4.2 kg/sq m), 10 dB attenuation in 10 to 10,000 Hz range.

2.5 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch (25 mm) thick insulation with sheet metal cover.

D. Access doors smaller than 12 inches (300 mm) square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches (450 mm) square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches (600 x 1200 mm). Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.6 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturer’s instructions.

B. Provide balancing dampers at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing.

C. Use of splitter dampers is not acceptable.

D. Provide balancing dampers on medium and high pressure systems where indicated.

E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

F. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.

G. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

H. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Cover connections to medium and high pressure fans with leaded vinyl sheet, held in place with metal straps.

I. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch (200 x 200 mm) size for hand access, 18 x 18 inch (450 x 450 mm) size for shoulder access, and as indicated.

J. Provide duct test holes where indicated and required for testing and balancing purposes.

End of Section

SECTION 233100 DUCTWORK

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Low Pressure Duct.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. ASHRAE - Handbook 1981 Fundamentals; Chapter 33 - Duct Design.

B. ASHRAE - Handbook 1983 Equipment; Chapter 1 - Duct Construction.

C. ASTM A 90 - Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.

D. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

E. ASTM A 525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.

F. ASTM A 527 - Steel Sheet, Zinc-Coated (Galvanized) by Hot- Dip Process, Lock Forming Quality.

G. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

H. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems.

I. SMACNA - Low Pressure Duct Construction Standards.

J. SMACNA - High Pressure Duct Construction Standards.

K. UL 181 - Factory-Made Air Ducts and Connectors.

1.3 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.

B. Low Pressure: Three pressure classifications: 1/2 inch WG (125 Pa) positive or negative static pressure and velocities less than 2,000 fpm (10 m/sec); 1 inch WG (250 Pa) positive or negative static pressure and velocities less than 2,500 fpm (12.7 m/sec) and 2 inch WG (500 Pa) positive or negative static pressure and velocities less than 2,500 fpm (12.7 m/sec).

1.4 REGULATORY REQUIREMENTS

A. Construct ductwork to NFPA 90A and NFPA 90B standards.

1.5 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 01330, Submittal Procedures.

B. Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for low pressure, medium and high pressure systems.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division 1, Section 01600 Product Requirements.

B. Store and protect products under provisions of Section 01600.

PART 2 PRODUCTS

2.1 MATERIALS

A. General: Noncombustible or conforming to requirements for Class 1 air duct materials, or UL 181.

B. Steel Ducts: ASTM A525 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz per sq ft (382 g/sq m) for each side in conformance with ASTM A90.

C. Flexible Ducts: fabric supported by helically wound spring steel wire or flat steel bands; rated to 2 inches WG (500 Pa) positive and 1.5 inches WG (375 Pa) negative for low pressure ducts and 15 inches WG (3.75 kPa) positive or negative for medium high pressure ducts.

D. Insulated Flexible Ducts: Flexible duct wrapped with flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75 degrees F (0.034 KSI at 24 degrees C).

E. Fasteners: Rivets, bolts, or sheet metal screws.

F. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape, or heavy mastic.

G. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide turning vanes.

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

E. Provide easements where low pressure ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

F. Connect flexible ducts to metal ducts with liquid adhesive plus tape.

G. Use crimp joints with or without bead for joining round duct sizes 8 inch (200 mm) and smaller with crimp in direction of air flow.

H. Use double nuts and lock washers on threaded rod supports.

PART 3 EXECUTION

3.1 INSTALLATION

A. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

B. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

C. Set plenum doors 6 to 12 inches (150 to 300 mm) above floor. Arrange door swings so that fan static pressure holds door in closed position.

D. Connect terminal units to medium or high pressure ducts with one foot (300 mm) maximum length of flexible duct. Do not use flexible duct to change direction.

E. Connect diffusers or troffer boots to low pressure ducts with 6 feet (1.8 m) maximum length of flexible duct. Hold in place with strap or clamp.

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

3.2 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply (Heating Systems)	Steel,
Low Pressure Supply (System with Cooling Coils)	Steel
Return and Relief	Steel
General Exhaust	Steel

Outside Air Intake	Steel
Combustion Air	Steel

3.3 ADJUSTING AND CLEANING

A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.

B. Clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

End of Section

SECTION 233400 HVAC FANS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Ceiling fans.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. AMCA 99 - Standards Handbook.

B. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.

C. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.

D. AMCA 300 - Test Code for Sound Rating Air Moving Devices.

E. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.

F. NEMA MG1 - Motors and Generators.

G. NFPA 70 - National Electrical Code.

H. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease Vapors from Commercial cooking Equipment.

I. UL 705 - Power Ventilators.

1.3 SUBMITTALS

A. Submit under provisions of Division 1, Section 013000 Submittal Procedures.

B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, sound power levels at rated capacity, and electrical characteristics and connection requirements.

C. Manufacturer’s Installation Instructions.

1.4 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1, Section 017823 Operation and Maintenance Data.

B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 EXTRA MATERIALS

A. Furnish under provisions of Section 017700.

B. Provide two sets of belts for each fan.

PART 2 PRODUCTS

2.1 CEILING FANS

A. Manufacturers:
1. Fans shall be manufactured by one of the following acceptable manufacturers:
a. Carnes Company, Inc..
b. Greenheck Fan Corp..
c. Loren Cook Company.
d. Penn Ventilator Company.

B Performance
1. See schedules on plans for performance and electrical requirements.

C Centrifugal Fan Unit: Direct driven with galvanized steel housing lined with 1/2 inch (13 mm) acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge opening, integral outlet duct collar. Discharge position convertible by moving interchangeable panels.

D Disconnect Switch: Fan mounted toggle switch for thermal overload protected motor.

E Grille: Molded white.

F Wheel: Centrifugal forward curved type constructed of injection molded or polypropylene resin.

G Motor: Open drip proof type with permanently lubricated sealed bearings and thermal overload protection.

H Accessories:
1. Rubber-in-shear vibration isolator.
2. Fan speed controller.
3. Time delay relay.

I. Electrical Characteristics and Components
1. Motor: Refer to Section 231700.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Install flexible connections specified in Section 233000 between fan inlet and ductwork. Ensure metal bands of connectors are parallel with minimum one inch (25 mm) flex between ductwork and fan while running.

C. Provide sheaves required for final air balance.

D. Install backdraft dampers on inlet to roof and wall exhausters.

E. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

F. Do not operate fans for any purpose until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

End of Section

SECTION 233700 AIR OUTLETS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Rectangular Ceiling Diffusers.

B. Related Documents: The Contract Documents, as defined in Section 011000-Summary, 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.

1.2 REFERENCES

A. ADC 1062 - Certification, Rating and Test Manual.

B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.

C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

D. ARI 650 - Air Outlets and Inlets.

E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.

F. SMACNA - Low Pressure Duct Construction Standard.

1.3 QUALITY ASSURANCE

A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.

B. Test and rate performance of louvers in accordance with AMCA 500.

1.4 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

1.5 SUBMITTALS

A. Submit product data under provisions of Division 1, Section 013300 Submittal Procedures.

B. Provide product data for items required for this project.

C. Submit schedule of outlets and inlets indicating type, size, location, application, and noise level.

D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.

E. Submit manufacturer’s installation instructions.

F. Submit two color charts for finish of external louvers, Architect shall select color.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - CEILING DIFFUSERS

A. Unless noted otherwise in this specification section all air distribution shall be manufactured by one of the following acceptable manufacturers:
1. Carnes Company, Inc..
2. E.H. Price Limited
3. Krueger Manufacturing Company.
4. Metal Industries, Inc..
5. Nailor Industries, Inc..

B. See schedules on plans for size and model numbers.

C. Substitutions: Under provisions of Section 01600.

2.2 RECTANGULAR CEILING DIFFUSERS

A. Rectangular, stamped, multicore type diffuser to discharge air in 360 degree pattern with sectorizing baffles where indicated.

B. Provide surface mount or inverted T-bar type frames to match ceiling type, coordinate frame type with architectural plans.

C. Fabricate of steel with baked enamel off-white finish.

D. Provide radial opposed blade or butterfly damper and multi-louvered equalizing grid with damper adjustable from diffuser face.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturers' instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement. Refer to Section 09900.

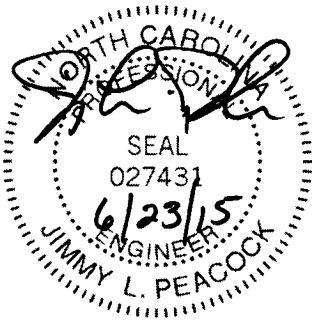
C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.

E. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09900.

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
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 Crawlspaces: 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. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

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 slottedsupport 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 approvied 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 recpetacle 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 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

D. Diffusers and Globes:

1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

    a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
    b. UV stabilized.

2. Glass: Annealed crystal glass unless otherwise indicated.

E. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp and ballast characteristics:

    a. "USE ONLY" and include specific lamp type.
    b. Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
    c. Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
    d. Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
    e. ANSI ballast type (M98, M57, etc.) for HID luminaires.
    f. CCT and CRI for all luminaires.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

A. General Requirements for Electronic Ballasts:

1. Comply with UL 935 and with ANSI C82.11.
2. Designed for type and quantity of lamps served.
3. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: Less than 10 percent.
6. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
7. Operating Frequency: 42 kHz or higher.
8. Lamp Current Crest Factor: 1.7 or less.
9. BF: 0.8 or higher.
10. Power Factor: 0.95 or higher.
11. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.
12. Ballasts shall utilize 32W T8 lamps.

B. Electronic Programmed-Start/Instant-Start Ballasts for T8 Lamps: Comply with ANSI C82.11 and the following:

1. Automatic lamp starting after lamp replacement.

2.4 FLUORESCENT LAMPS

A. T8 instant-start lamps, rated 32 W maximum, nominal length of 48 inches (1220 mm), 2800 initial lumens (minimum), CRI 80 (minimum), color temperature 3500K, and average rated life 20,000 hours unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

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