PROJECT MANUAL
including

SPECIFICATIONS
for construction of the

NCDOT Division III
Multi-Unit Office Building
(Castle Hayne)

SCO# 15-12499-02A B-C #16005

Pender County
5501 Barbados Blvd.
Castle Hayne, North Carolina 28429

February 5, 2018

Plan Set # _____

BID SET

BURNETTE • CHALK ARCHITECTURE & PLANNING P.A.

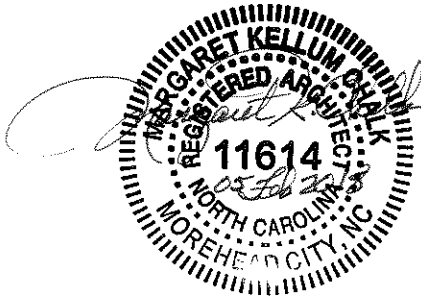
105 BANKS STREET MOREHEAD CITY, NORTH CAROLINA 28557
252 726-5387 252 726-3099 FAX 252 726-1250 info@burnchalk.com www.burnchalk.com

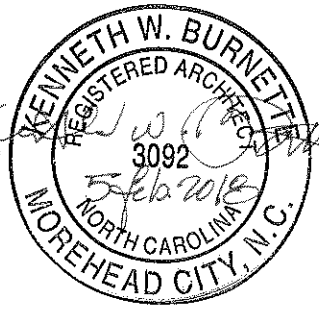
PROJECT: NCDOT Castle Hayne Multi-Unit Office Building

LOCATION: NCDOT Division 3 Office
5501 Barbados Blvd.
Castle Hayne, NC 28429Castle Hayne, NC

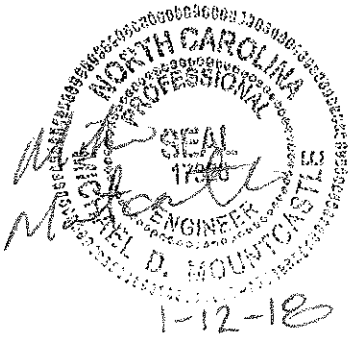
OWNER: Sterling Baker
NCDOT
1 South Wilmington Street
1525 Mail Service Center
Raleigh, NC 27699-1525

ARCHITECT: Margaret K. Chalk, AIA, NCARB
Kenneth W. Burnette, AIA, LEED AP
Burnette • Chalk Architecture & Planning, P.A.
105 Banks Street
Morehead City, NC 28557





STRUCTURAL: Mike Mountcastle, P.E.
NCDOT
1 South Wilmington Street
1525 Mail Service Center
Raleigh, NC 27699-1525



PLUMBING, MECHANICAL ELECTRICAL:

Mike Stroud, P.E, LEED AP,
Stroud Engineering, P.A.
107 B Commerce Street
Greenville, NC 27858

NORTH CAROLINA PROFESSIONAL SEAL PE021990 ENGINEER L. MICHAEL STROUD

11/20/17

CIVIL:

Richie Brown, P.E.,
Stroud Engineering, P.A.
107 B Commerce Street
Greenville, NC 27858

NORTH CAROLINA PROFESSIONAL SEAL 36845 ENGINEER RICHARD A. BROWN

11/20/17

END OF COVER PAGE

ADVERTISEMENT FOR BIDS

Sealed proposals will be received by the North Carolina Department of Transportation (NCDOT) in the conference room of the NCDOT Division 3 Offices, Barbados Blvd., Castle Hayne, NC 28429 until 3:00 PM EST on Thursday, March 15, 2018 and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of a multi-unit office building consisting of a single story office building approximately 5669 SF in size with associated parking, drive and site work.

A mandatory pre-bid meeting will be held for all interested bidders at 10:00 AM EST on February 22, 2018 on site at the NCDOT office, 5501 Barbados Blvd., Castle Hayne, NC. The meeting will address project specific questions, issues, bidding procedures and bid forms.

Complete plans and specifications for this project can be obtained from Burnette • Chalk Architecture & Planning, P.A., 105 Banks Street, Morehead City, North Carolina 28557 during normal office hours after 1:00 PM, February 12, 2018. A Plan Deposit of $150.00 in cash or certified check is required.

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

Owner: Sterling Baker
NCDOT
Raleigh, NC

Designer: Margaret K. Chalk, AIA, NCARB
Kenneth W. Burnette, AIA, LEED AP
Burnette • Chalk Architecture and Planning, P.A.
105 Banks Street
Morehead City, NC 28557

SECTION 00 0002
NOTICE TO BIDDERS

Sealed proposals will be received by the North Carolina Department of Transportation (NCDOT) until 3:00 pm on Thursday, March 15, 2018, and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of a multi-unit office building consisting of a single story office building approximately 5669 SF in size with associated parking, drive and site work. Clearly mark envelope indicating that enclosure is a **Sealed Bid** for construction of NCDOT Castle Hayne Multi-unit Office Building and that the envelope is to remain sealed.

Complete plans, specifications and contract documents will be open for inspection in the office of Burnette • Chalk Architecture and Planning, P.A., Morehead City, NC 28557; or may be obtained from • Burnette Architecture & Planning, by those qualified and who will make a bid, upon deposit of one hundred dollars ($150.00) in cash or certified check. The full plan deposit, less the cost of Plan Shipment, will be returned to contractors submitting bids provided all documents are returned in good condition within ten (10) days after the bid date. Plan deposits will be returned to contractors not submitting bids provided all documents are returned in good condition at least ten (10) days prior to the bid date. A digital copy of the Construction Documents in PDF format may be obtained at no additional charge.

A mandatory pre-bid meeting will be held for all interested bidders at 10:00 AM on Thursday, February 22, 2018 at the building site at 5501 Barbabos Blvd., Castle Hayne, NC, in the adjacent NCDOT office building Conference Room. Any prospective bidder not attending will not be permitted to submit a bid on this project. The meeting will address project specific question, issues, bidding procedures and bid forms.

The scope of the work is approximately: The construction of a multi-unit office building, one story, inclusive of site work, drive, and parking lots.

A single prime combined proposal for all work will be received. All proposals shall be lump sum.

All contractors are hereby notified that they must have proper license under the state laws governing their respective trades.

General contractors are notified that Chapter 87, Article 1, General Statues of North Carolina, will be observed in receiving and awarding general contracts. General contractors submitting bids on this project must have license classification for unlimited building.

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

A performance bond and payment bond will be required for one hundred percent 100%) of the contract price.

Payment will be made on the basis of ninety-five percent (95%) of monthly estimates and final payment made upon completion and acceptance of work.

No bid may be withdrawn after the scheduled closing time for the receipt of bids for a period of ninety (90) days.

The owner reserves the right to reject any or all bids and to waive informalities.

Signed:

Sterling Baker
NCDOT
Raleigh, NC

Designer:

Burnette • Chalk Architecture and Planning, P.A.
105 Banks Street
Morehead City, NC 28557

TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS

Division 0 **Bidding & Contract Requirements**

00 0001	Cover Page
00 0001a	Advertisement for Bids
00 0002	Notice to Bidders
00 0005	Table of Contents
00 0700	Instructions to Bidders and General Conditions of the Contract for Construction (Form OC-15, Revised January 2013)
00 0810	Supplementary Instructions to Bidders and General Conditions of the Contract
00 0850	Guideline MBE
00 0880	Subsurface Information
00 0880A	Revised Soil Evaluation Report of May 1, 2017

Division 1 **General Requirements**

01 1000	Summary of Work
01 2000	Price & Payment Procedures
01 2200	Unit Prices
01 3000	Administrative Requirements
01 4000	Quality Requirements
01 4100	Statement of Special Inspections
01 4100A	Contractor's Statement of Responsibility
01 5000	Field Offices
01 5500	Vehicular Access and Parking
01 6000	Product Requirements
01 7000	Project Closeout
01 7100	Cleaning
01 7123	Field Engineering
01 7200	Project Record Documents
01 7419	Construction Waste Management and Disposal

Division 2 **Existing Conditions**

This section not used

Division 3 **Concrete**

03 3000	Cast-In-place Concrete

Division 4 **Masonry**

04 0511	Masonry Mortaring and Grouting
04 2000	Unit Masonry

Division 5 **Metals**

05 5000	Metal Fabrications

Division 6 **Wood, Plastics, and Composites**

06 1000	Rough Carpentry
06 1753	Shop-Fabricated Wood Trusses
06 2000	Carpentry and Finish Carpentry
06 4023	Interior Architectural Woodwork
06 6000	Cellular PVC Fabrications

Division 7 **Thermal And Moisture Protection**

07 2100	Thermal Insulation
07 2500	Weather Barriers
07 4113	Preformed Metal Roof Panels
07 4600	Exterior Trim
07 6510	Flexible Copper Sheet Flashings
07 9200	Joint Sealers

Division 8 **Openings**

08 1113	Hollow Metal Doors and Frames
08 1416	Flush Wood Doors
08 3113	Access Panels and Frames
08 4113	Aluminum Framed Entrances & Storefronts
08 5500	Aluminum-Clad Wood Casement Windows
08 7100	Finish Hardware
08 8000	Glazing

Division 9 **Finishes**

09 2100	Gypsum Wallboard System
09 3000	Tile
09 5100	Suspended Acoustical Ceilings
09 6513	Resilient Base and Accessories
09 6813	Carpet Tile
09 8000	Chemically Resistant Epoxy Flooring
09 9100	Paints and Coatings

Division 10 **Specialties**

10 1100	Markerboards and Tackboards
10 2113	Plastic Toilet Compartments
10 2800	Toilet Accessories
10 4250	Signage and Graphics
10 4250a	Conference Sign
10 4250b	Men/Women Restroom Sign
10 4250c	Project Sign
10 4413	Fire Extinguisher & Cabinets
10 6730	Metal Shelving

Division 11 **Equipment**

11 1200	Traffic Control

Division 12 **Furnishings**

12 2113	Horizontal Louver Blinds

Division 13 **Special Construction**

This section not used

Division 14 **Conveying Equipment**

This section not used

Division 22 **Plumbing**

22 0553	Identification for Plumbing and Equipment
22 0719	Plumbing Piping Insulation
22 1005	Plumbing Piping
22 1006	Plumbing Piping Specialties
22 3001	Plumbing Point of Use Type Water Heaters
22 4000	Plumbing Fixtures

Division 23 **Heating, Ventilating And Air Conditioning (HVAC)**

23 0593	Testing, Adjusting, and Balancing for HVAC
23 0713	Duct Insulation
23 0719	HVAC Piping Insulation
23 2300	Refrigerant Piping
23 3100	HVAC Ducts and Casings
23 3300	Air Duct Accessories

23 3423	Power Ventilators
23 3700	Air Outlets and Inlets
23 8127	Small Split-Systems Heating and Cooling

Division 26 Electrical

26 0519	Low-Voltage Electrical Power Conductors and Cables
26 0526	Grounding and Bonding for Electrical Systems
26 0529	Hangers and Supports for Electrical Systems
26 0534	Conduit
26 0536	Cable Trays for Electrical Systems
26 0537	Boxes
26 0553	Identification for Electrical Systems
26 0801	Electrical Testing and Inspections
26 0923	Lighting Control Devices
26 2100	Low-Voltage Electrical Service Entrance
26 2416	Panelboards
26 2726	Wiring Devices
26 2818	Enclosed Switches
26 4300	Surge Protective Devices
26 5100	Interior Lighting
26 5600	Exterior Lighting

Division 31 Earthwork

31 2200	Grading
31 2316	Excavation
31 2316.13	Trenching
31 2323	Fill
31 3116	Termite Control
31 3700	Riprap

Division 32 Exterior Improvements

32 1123	Aggregate Base Course
32 1216	Asphalt Paving
32 1723.13	Painted Pavement Markings
32 9219	Seeding
32 9223	Sodding

Division 33 Utilities

33 1116	Site Water Utility Distribution Piping
33 1300	Disinfecting of Water Utility Distribution
33 3111	Site Sanitary Sewerage Piping
33 4111	Site Storm Utility Drainage Piping

Forms and Appendices

Form of Proposal – Single Prime Contract
MBE Contractor List and Affidavits A thru D
Form of Bid Bond
Form of Construction Contract
Form of Performance Bond
Form of Payment Bond
Sheet for Attaching Power of Attorney
Sheet for Attaching Insurance Certificates
Form of Approval of the Attorney General

END OF TABLE OF CONTENTS

INSTRUCTIONS TO BIDDERS

AND

GENERAL CONDITIONS OF THE CONTRACT

STANDARD FORM FOR CONSTRUCTION PROJECTS

STATE CONSTRUCTION OFFICE

NORTH CAROLINA

DEPARTMENT OF ADMINISTRATION

Form OC-15

This document is intended for use on State capital construction projects and shall not be used on any project that is not reviewed and approved by the State Construction Office. Extensive modification to the General Conditions by means of "Supplementary General Conditions" is strongly discouraged. State agencies and institutions may include special requirements in "Division 1 – General Requirements" of the specifications, where they do not conflict with the General Conditions.

Twenty Fourth Edition January 2013
NCDOT Division 3 – Castle Hayne

INSTRUCTIONS TO BIDDERS

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

1. **PROPOSALS**

Proposals must be made in strict accordance with the Form of Proposal provided therefor, and all blank spaces for bids, alternates, and unit prices applicable to bidder's work shall be properly filled in. When requested alternates are not bid, the proposer shall so indicate by the words "No Bid". Any blanks shall also be interpreted as "No Bid".The bidder agrees that bid on Form of Proposal detached from specifications will be considered and will have the same force and effect as if attached thereto. Photocopied or faxed proposals will not be considered. Numbers shall be stated both in writing and in figures for the base bids and alternates. If figures and writing differ, the written number will supersede the figures.

Any modifications to the Form of Proposal (including alternates and/or unit prices) will disqualify the bid and may cause the bid to be rejected.

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

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

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

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

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

e. All signatures shall be properly witnessed.

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

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

Bidder shall identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts or an affidavit indicating work under contract will be self-performed, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f). Failure to comply with these requirements is grounds for rejection of the bid.

For projects bid in the single-prime alternative, the names and license numbers of major subcontractors shall be listed on the proposal form.

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

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

2. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a bid the bidder acknowledges that he has carefully examined all documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site, and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the material to be encountered, the character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work, the general and local conditions, the construction hazards, and all other matters, including, but not limited to, the labor situation which can in any way affect the work under the contract, and including all safety measures required by the Occupational Safety and Health Act of 1970 and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a proposal the bidder acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications and other contract documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with other contractors performing work on the site.

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

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

3. BULLETINS AND ADDENDA

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

Should the bidder find discrepancies in, or omission from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the designer who will send written instructions in the form of addenda to all bidders. Notification should be no later than seven (7) days prior to the date set for receipt of bids. Neither the owner nor the designer will be responsible for any oral instructions.

All addenda should be acknowledged by the bidder(s) on the Form of Proposal. However, even if not acknowledged, by submitting a bid, the bidder has certified that he has reviewed all issued addenda and has included all costs associated within his bid.

4. **BID SECURITY**

Each proposal shall be accompanied by a cash deposit or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a bid bond in an amount equal to not less than five percent (5%) of the proposal, said deposit to be retained by the owner as liquidated damages in event of failure of the successful bidder to execute the contract within ten (10) days after the award or to give satisfactory surety as required by law (G.S. 143-129).

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

5. **RECEIPT OF BIDS**

Bids shall be received in strict accordance with requirements of the General Statutes of North Carolina. Bid security shall be required as prescribed by statute. Prior to the closing of the bid, the bidder will be permitted to change or withdraw his bid. Guidelines for opening of public construction bids are available from the State Construction Office.

6. **OPENING OF BIDS**

Upon opening, all bids shall be read aloud. Once bidding is closed, there shall not be any withdrawal of bids by any bidder and no bids may be returned by the designer to any bidder. After the opening of bids, no bid may be withdrawn, except under the provisions of General Statute 143-129.1, for a period of thirty days unless otherwise specified. Should the successful bidder default and fail to execute a contract, the contract may be awarded to the next lowest and responsible bidder. The owner reserves the unqualified right to reject any and all bids. Reasons for rejection may include, but shall not be limited to, the following:

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

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

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

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

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

f. If the unit prices contained in the bid schedule are unacceptable to the owner and the State Construction Office.

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

7. BID EVALUATION

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

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

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

b. A listing of completed projects of similar size.

c. Permanent name and address of place of business.

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

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

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

g. If prequalified, contractor info will be reviewed and evaluated comparatively to submitted prequalification package.

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

In determining the lowest responsible, responsive bidder, the owner shall take into consideration the bidder's compliance with the requirements of G.S. 143-128.2(c), the past performance of the bidder on construction contracts for the State with particular concern given to completion times, quality of work, cooperation with other contractors, and cooperation with the designer and owner. Failure of the low bidder to furnish affidavit and/or documentation as required by G.S. 143-128.2(c) shall constitute a basis for disqualification of the bid.

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

8. PERFORMANCE BOND

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

9. PAYMENT BOND

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

10. PAYMENTS

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

11. PRE-BID CONFERENCE

Prior to the date set for receiving bids, the Designer may arrange and conduct a Pre-Bid Conference for all prospective bidders. The purpose of this conference is to review project requirements and to respond to questions from prospective bidders and their subcontractors or material suppliers related to the intent of bid documents. Attendance by prospective bidders shall be as required by the "Notice to Bidders".

12. SUBSTITUTIONS

In accordance with the provisions of G.S. 133-3, material, product, or equipment substitutions proposed by the bidders to those specified herein can only be considered during the bidding phase until ten (10) days prior to the receipt of bids when submitted to the Designer with sufficient data to confirm material, product, or equipment equality. Proposed substitutions submitted after this time will be considered only as potential change order.

Submittals for proposed substitutions shall include the following information:

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

b. Trade name, model or catalog designation.

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

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

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

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

GENERAL CONDITIONS OF THE CONTRACT

The use or reproduction of this document or any part thereof is authorized for and limited to use on projects of the State of North Carolina, and is distributed by, through and at the discretion of the State Construction Office, Raleigh, North Carolina, for that distinct and sole purpose.

TABLE OF CONTENTS

ARTICLE	TITLE	PAGE
1	Definitions	9
2	Intent and Execution of Documents	11
3	Clarifications and Detail Drawings	12
4	Copies of Drawings and Specifications	12
5	Shop Drawings, Submittals, Samples, Data	13
6	Working Drawings and Specifications at the Job Site	13
7	Ownership of Drawings and Specifications	14
8	Materials, Equipment, Employees	14
9	Royalties, Licenses and Patent	15
10	Permits, Inspections, Fees, Regulations	15
11	Protection of Work, Property and the Public	16
12	Sedimentation Pollution Control Act of 1973	17
13	Inspection of the Work	17
14	Construction Supervision and Schedule	18
15	Separate Contracts and Contractor Relationships	22
16	Subcontracts and Subcontractors	23
17	Contractor and Subcontractor Relationships	23
18	Designer's Status	24
19	Changes in the Work	25
20	Claims for Extra Cost	27
21	Minor Changes in the Work	29
22	Uncorrected Faulty Work	29
23	Time of Completion, Delays, Extension of Time	29
24	Partial Utilization: Beneficial Occupancy	30
25	Final Inspection, Acceptance, and Project Closeout	31
26	Correction of Work Before Final Payment	31
27	Correction of Work After Final Payment	32
28	Owner's Right to Do Work	32
29	Annulment of Contract	32
30	Contractor's Right to Stop Work or Terminate the Contract	33
31	Requests for Payments	33
32	Certificates of Payment and Final Payment	34
33	Payments Withheld	36
34	Minimum Insurance Requirements	36
35	Performance Bond and Payment Bond	37
36	Contractor's Affidavit	38
37	Assignments	38
38	Use of Premises	38
39	Cutting, Patching and Digging	38
40	Utilities, Structures, Signs	38
41	Cleaning Up	40
42	Guarantee	41

43 Codes and Standards 41
44 Indemnification 41
45 Taxes 41
46 Equal Opportunity Clause 42
47 Employment of the Handicapped 42
48 Asbestos-Containing Materials (ACM) 43
49 Minority Business Participation 43
50 Contractor Evaluation 43
51 Gifts 43
52 Auditing Access to Persons and Records 44
53 North Carolina False Claims Act 44
54 Termination for Convenience 45

ARTICLE 1 - DEFINITIONS

a. The **contract documents** consist of the Notice to Bidders; Instructions to Bidders; General Conditions of the Contract; special conditions if applicable; Supplementary General Conditions; the drawing and specifications, including all bulletins, addenda or other modifications of the drawings and specifications incorporated into the documents prior to their execution; the proposal; the contract; the performance bond; the payment bond; insurance certificates; the approval of the attorney general; and the certificate of the Office of State Budget and Management. All of these items together form the contract.

b. The **owner** is the State of North Carolina through the agency named in the contract.

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

d. The **contractor**, as referred to hereinafter, shall be deemed to be either of the several contracting parties called the "Party of the First Part" in either of the several contracts in connection with the total project. Where, in special instances hereinafter, a particular contractor is intended, an adjective precedes the word "contractor," as "general," "heating," etc. For the purposes of a single prime contract, the term Contractor shall be deemed to be the single contracting entity identified as the "Party of the First Part" in the single Construction Contract. Any references or adjectives that name or infer multiple prime contractors shall be interpreted to mean the single prime Contractor.

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

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

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

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

i. **Project Expediter,** as used herein, is an entity stated in the contract documents, designated to effectively facilitate scheduling and coordination of work activities. See Article 14(f) for responsibilities of a Project Expediter. **For the purposes of a single prime contract, the single prime contractor shall be designated as the Project Expediter.**

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

k. **Field Order,** as used herein, shall mean a written approval for the contractor to proceed with the work requested by owner prior to issuance of a formal Change Order. The field order shall be signed by the contractor, designer, owner, and State Construction Office.

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

m. **Liquidated damages,** as stated in the contract documents, is an amount reasonably estimated in advance to cover the consequential damages associated with the Owner's economic loss in not being able to use the Project for its intended purposes at the end of the contract's completion date as amended by change order, if any, by reason of failure of the contractor(s) to complete the work within the time specified. Liquidated damages does not include the Owner's extended contract administration costs (including but not limited to additional fees for architectural and engineering services, testing services, inspection services, commissioning services, etc.), such other damages directly resulting from delays caused solely by the contractor, or consequential damages that the Owner identified in the bid documents that may be impacted by any delay caused soley by the Contractor (e.g., if a multi-phased project-subsequent phases, delays in start other projects that are dependent on the completion of this Project, extension of leases and/or maintenance agreements for other facilities).

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

o. **Routine written communications between the Designer and the Contractor** are any communication other than a "request for information" provided in letter, memo, or transmittal format, sent by mail, courier, electronic mail, or facsimile. Such communications can not be identified as "request for information".

p. **Clarification or Request for information (RFI)** is a request from the Contractor seeking an interpretation or clarification by the Designer relative to the contract documents. The RFI, which shall be labeled (RFI), shall clearly and concisely set forth the issue or item requiring clarification or interpretation and why the response is needed. The RFI must set forth the Contractor's interpretation or understanding of the contract documents requirements in question, along with reasons for such an understanding.

q. **Approval** means written or imprinted acknowledgement that materials, equipment or methods of construction are acceptable for use in the work.

r. **Inspection** shall mean examination or observation of work completed or in progress to determine its compliance with contract documents.

s. **"Equal to" or "approved equal"** shall mean materials, products, equipment, assemblies, or installation methods considered equal by the bidder in all characteristics (physical, functional, and aesthetic) to those specified in the contract documents. Acceptance of equal is subject to approval of Designer and owner.

t. **"Substitution" or "substitute"** shall mean materials, products, equipment, assemblies, or installation methods deviating in at least one characteristic (physical, functional, or aesthetic) from those specified, but which in the opinion of the bidder would improve competition and/or enhance the finished installation. Acceptance of substitution is subject to the approval of the Designer and owner.

u. **Provide** shall mean furnish and install complete in place, new, clean, operational, and ready for use.

v. **Indicated and shown** shall mean provide as detailed, or called for, and reasonably implied in the contract documents.

w. **Special inspector** is one who inspects materials, installation, fabrication, erection or placement of components and connections requiring special expertise to ensure compliance with the approved construction documents and referenced standards.

x. **Commissioning** is a quality assurance process that verifies and documents that building components and systems operate in accordance to the owner's project requirements and the project design documents.

y. **Designer Final Inspection** is the inspection performed by the design team to determine the completeness of the project in accordance with approved plans and specifications. This inspection occurs prior to SCO final inspection.

z. **SCO Final Inspection** is the inspection performed by the State Construction Office to determine the completeness of the project in accordance with NC Building Codes and approved plans and specifications.

aa. **Beneficial Occupancy** is requested by the owner and is occupancy or partial occupancy of the building after all life safety items have been completed as determined by the State Construction Office. Life safety items include but not limited to fire alarm, sprinkler, egress and exit lighting, fire rated walls, egress paths and security.

bb. Final Acceptance is the date in which the State Construction Office accepts the construction as totally complete. This includes the SCO Final Inspection and certification by the designer that all punch lists are completed.

ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

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

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

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

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

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

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

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

5. All signatures shall be properly witnessed.

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

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

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

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

10. The contractor's signature on the performance bond and the payment bond shall correspond with that on the contract. The date of performance and payment bond shall not be prior to the date of the contract.

ARTICLE 3 - CLARIFICATIONS AND DETAIL DRAWINGS

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

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

ARTICLE 4 - COPIES OF DRAWINGS AND SPECIFICATIONS

The designer or Owner shall furnish free of charge to the contractors electronic copies of plans and specifications. If requested by the contractor, paper copies of plans and specifications shall be furnished free of charge as follows:

a. General contractor - Up to twelve (12) sets of general contractor drawings and specifications, up to six (6) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

b. Each other contractor - Up to six (6) sets of the appropriate drawings and specifications, up to three (3) sets of which shall include drawings and specifications of all other contracts, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

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

d. For the purposes of a single-prime contract, the contractor shall receive up to 30 sets of drawings and specifications, plus a clean set of black line prints on white paper of all appropriate drawings, upon which the contractor shall clearly and legibly record all work-in-place that is at variance with the contract documents.

ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA

a. Within 15 consecutive calendar days after the notice to proceed, each prime contractor shall submit a schedule for submission of all shop drawings, product data, samples, and similar submittals through the Project Expediter to the Designer. This schedule shall indicate the items, relevant specification sections, other related submittal, data, and the date when these items will be furnished to the designer.

b. The Contractor(s) shall review, approve and submit to the Designer all Shop Drawings, Coordination Drawings, Product Data, Samples, Color Charts, and similar submittal data required or reasonably implied by the Contract Documents. Required Submittals shall bear the Contractor's stamp of approval, any exceptions to the Contract Documents shall be noted on the submittals, and copies of all submittals shall be of sufficient quantity for the Designer to retain up to three (3) copies of each submittal for his own use plus additional copies as may be required by the Contractor. Submittals shall be presented to the Designer in accordance with the schedule submitted in paragraph (a). so as to cause no delay in the activities of the Owner or of separate Contractors.

c. The Designer shall review required submittals promptly, noting desired corrections if any, and retaining three (3) copies (1 for the Designer, 1 for the owner and 1 for SCO) for his use. The remaining copies of each submittal shall be returned to the Contractor not later than twenty (20) days from the date of receipt by the Designer, for the Contractor's use or for corrections and resubmittal as noted by the Designer. When resubmittals are required, the submittal procedure shall be the same as for the original submittals.

d. Approval of shop drawings/submittals by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with the design or terms of the contract documents nor from responsibility of errors of any sort in the shop drawings, unless such lack of compliance or errors first have been called in writing to the attention of the Designer by the Contractor.

ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

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

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

c. The contractor shall maintain at the job office a record of all required tests that have been performed, clearly indicating the scope of work inspected and the date of approval or rejection.

ARTICLE 7 - OWNERSHIP OF DRAWINGS AND SPECIFICATIONS

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

ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES

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

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

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

d. Products are generally specified by ASTM or other reference standard and/or by manufacturer's name and model number or trade name. When specified only by reference standard, the Contractor may select any product meeting this standard, by any manufacturer. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. However, the contractor shall be aware that the cited examples are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable. Request for substitution of materials, items, or equipment shall be submitted to the designer for approval or disapproval; such approval or disapproval shall be made by the designer prior to the opening of bids. Alternate materials may be requested after the award if it can clearly be demonstrated that it is an added benefit to the owner and the designer and owner approves.

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

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

ARTICLE 9 - ROYALTIES, LICENSES AND PATENTS

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

ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS

a. The contractor shall give all notices and comply with all laws, ordinances, codes, rules and regulations bearing on the conduct of the work under this contract. If the contractor observes that the drawings and specifications are at variance therewith, he shall promptly notify the designer in writing. See Instructions to Bidders, Paragraph 3, Bulletins and Addenda. Any necessary changes required after contract award shall be made by change order in accordance with Article 19. If the contractor performs any work knowing it to be contrary to such laws, ordinances, codes, rules and regulations, and without such notice to the designer, he shall bear all cost arising therefrom. Additional requirements implemented after bidding will be subject to equitable negotiations.

b. All work under this contract shall conform to the North Carolina State Building Code and other State, local and national codes as are applicable. The cost of all required inspections and permits shall be the responsibility of the contractor and included within the bid proposal. All water taps, meter barrels, vaults and impact fees shall be paid by the contractor unless otherwise noted.

d. Projects constructed by the State of North Carolina or by any agency or institution of the State are not subject to inspection by any county or municipal authorities and are not subject to county or municipal building codes. The contractor shall, however, cooperate with the county or municipal authorities by obtaining building permits. Permits shall be obtained at no cost.

e. Projects involving local funding (community colleges) are subject also to county and municipal building codes and inspection by local authorities. The contractor shall pay the cost of these permits and inspections.

ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC

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

b. The contractor shall provide cover and protect all portions of the structure when the work is not in progress, provide and set all temporary roofs, covers for doorways, sash and windows, and all other materials necessary to protect all the work on the building, whether set by him, or any of the subcontractors. Any work damaged through the lack of proper protection or from any other cause, shall be repaired or replaced without extra cost to the owner.

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

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

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

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

g. The contractor shall designate a responsible person of his organization as safety officer/inspector to inspect the project site for unsafe health and safety hazards, to report these hazards to the contractor for correction, and whose duties also include accident prevention on the project, and to provide other safety and health measures on the project site as required by the terms and conditions of the contract.The name of the safety inspector shall be made known to the designer and owner at the time of the preconstruction conference and in all cases prior to any work starting on the project.

h. In the event of emergency affecting the safety of life, the protection of work, or the safety of adjoining properties, the contractor is hereby authorized to act at his own discretion, without further authorization from anyone, to prevent such threatened injury or damage.

Any compensation claimed by the contractor on account of such action shall be determined as provided for under Article 19(b).

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

ARTICLE 12 - SEDIMENTATION POLLUTION CONTROL ACT OF 1973

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

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

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

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

ARTICLE 13 - INSPECTION OF THE WORK

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

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

c. All work shall be inspected by designer, special inspector and/or State Construction Office prior to being covered by the contractor. Contractor shall give a minimum two weeks notice unless otherwise agreed to by all parties. If inspection fails, after the first reinspection all costs associated with additional reinspections shall be borne by the contractor.

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

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

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

ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE

a. Throughout the progress of the work, each contractor shall keep at the job site, a competent superintendent and supervisory staff satisfactory to the designer and the owner. The superintendent and supervisory staff shall not be changed without the consent of the designer and owner unless said superintendent ceases to be employed by the contractor or ceases to be competent as determined by the contractor, designer or owner. The superintendent and other staff designated by the contractor in writing shall have authority to act on behalf of the contractor, and instructions, directions or notices given to him shall be as binding as if given to the contractor. However, directions, instructions, and notices shall be confirmed in writing.

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

c. All contractors shall be required to cooperate and consult with each other during the construction of this project. Prior to installation of work, all contractors shall jointly prepare coordination drawings, showing locations of various ductworks, piping, motors, pumps, and other mechanical or electrical equipment, in relation to the structure, walls and ceilings. These drawings shall be submitted to the designer through the Project Expediter for information only. Each contractor shall lay out and execute his work to cause the least delay to other contractors. Each contractor shall be financially responsible for any damage to other contractor's work and for undue delay caused to other contractors on the project.

d. The contractor is required to attend job site progress conferences as called by the designer. The contractor shall be represented at these job progress conferences by both home office and project personnel. These representatives shall have authority to act on behalf of the contractor. These meetings shall be open to subcontractors, material

suppliers and any others who can contribute toward maintaining required job progress. It shall be the principal purpose of these meetings, or conferences, to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the project on schedule and to complete the project within the specified contract time. Each contractor shall be prepared to assess progress of the work as required in his particular contract and to recommend remedial measures for correction of progress as may be appropriate. The designer or his authorized representative shall be the coordinator of the conferences and shall preside as chairman. The contractor shall turn over a copy of his daily reports to the Designer and Owner at the job site progress conference. Owner will determine daily report format.

e The contractor(s) shall, employ an engineer or a land surveyor licensed in the State of North Carolina to lay out the work and to establish a bench mark in a location where same will not be disturbed and where direct instruments sights may be taken.

f. The designer shall designate a Project Expediter on projects involving two or more prime contracts. The Project Expediter shall be designated in the Supplementary General Conditions. The Project Expediter shall have at a minimum the following responsibilities.

1. Prepare the project construction schedule and shall allow all prime contractors (multi-prime contract) and subcontractors (single-prime contract) performing general, plumbing, HVAC, and electrical work equal input into the preparation of the initial construction schedule.

2. Maintain a project progress schedule for all contractors.

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

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

5. Recommend to the owner whether payment to a contractor shall be approved.

g. It shall be the responsibility of the Project Expediter to cooperate with and obtain from several prime contractors and subcontractors on the job, their respective work activities and integrate these activities into a project construction schedule in form of a detailed bar chart or Critical Path Method (CPM), schedule. Each prime contractor shall provide work activities within fourteen (14) days of request by the Project Expediter. A "work activity", for scheduling purposes, shall be any component or contractual requirement of the project requiring at least one (1) day, but not more than fourteen (14) days, to complete or fulfill. The project construction schedule shall graphically show all salient features of the work required to construct the project from start to finish and within the allotted time established in the contract. The time (in days) between the contractor's early completion and contractual completion dates is part of the project total float time; and shall be used as such, unless amended by a change order. On a multi-prime project, each prime contractor shall review the proposed construction schedule and approve same in writing. The Project Expediter shall submit the proposed construction schedule to the designer for comments. The complete Project construction schedule shall be of the type set forth in the Supplementary General Condition or subparagraph (1) or (2) below, as appropriate:

1. For a project with total contracts of $500,000 or less, a bar chart schedule will satisfy the above requirement. The schedule shall indicate the estimated starting and completion dates for each major element of the work.

2. For a project with total contracts over $500,000, a Critical Path Method (CPM) schedule shall be utilized to control the planning and scheduling of the Work. The CPM schedule shall be the responsibility of the Project Expediter and shall be paid for by the Project Expediter.

Bar Chart Schedule: Where a bar chart schedule is required, it shall be time-scaled in weekly increments, shall indicate the estimated starting and completion dates for each major element of the work by trade and by area, level, or zone, and shall schedule dates for all salient features, including but not limited to the placing of orders for materials, submission of shop drawings and other Submittals for approval, approval of shop drawings by designers, the manufacture and delivery of material, the testing and the installation of materials, supplies and equipment, and all Work activities to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all commissioning, required inspections and completion of final punchlist(s). Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

CPM Schedule: Where a CPM schedule is required, it shall be in time-scaled precedence format using the Project Expediter's logic and time estimates. The CPM schedule shall be drawn or plotted with activities grouped or zoned by Work area or subcontract as opposed to a random (or scattered) format. The CPM schedule shall be time-scaled on a weekly basis and shall be drawn or plotted at a level of detail and logic which will schedule all salient features of the work to be performed by the Contractor. The Contractor shall allow sufficient time in his schedule for all commissioning, required inspections and completion of final punchlist(s).. Each Work activity will be assigned a time estimate by the Contractor. One day shall be the smallest time unit used.

The CPM schedule will identify and describe each activity, state the duration of each activity, the calendar dates for the early and late start and the early and late finish of each activity, and clearly highlight all activities on the critical path. "Total float" and "free float" shall be indicated for all activities. Float time shall not be considered for the exclusive use or benefit of either the Owner or the Contractor, but must be allocated in the best interest of completing the Work within the Contract time. Extensions to the Contract time, when granted by Change Order, will be granted only when equitable time adjustment exceeds the Total Float in the activity or path of activities affected by the change. On contracts with a price over $2,500,000, the CPM schedule shall also show what part of the Contract Price is attributable to each activity on the schedule, the sum of which for all activities shall equal the total Contract Price.

Early Completion of Project: The Contractor may attempt to complete the project prior to the Contract Completion Date. However, such planned early completion shall be for the Contractor's convenience only and shall not create any additional rights of the Contractor or obligations of the Owner under this Contract, nor shall it change the Time

for Completion or the Contract Completion Date. The Contractor shall not be required to pay liquidated damages to the Owner because of its failure to complete by its planned earlier date. Likewise, the Owner shall not pay the Contractor any additional compensation for early completion nor will the Owner owe the Contractor any compensation should the Owner, its officers, employees, or agents cause the Contractor not to complete earlier than the date required by the Contract Documents.

h. The proposed project construction schedule shall be presented to the designer no later than fifteen (15) days after written notice to proceed. No application for payment will be processed until this schedule is accepted by the designer and owner.

i. The approved project construction schedule shall be distributed to all contractors and displayed at the job site by the Project Expediter.

j. The several contractors shall be responsible for their work activities and shall notify the Project Expediter of any necessary changes or adjustments to their work. The Project Expediter shall maintain the project construction schedule, making biweekly adjustments, updates, corrections, etc., that are necessary to finish the project within the Contract time, keeping all contractors and the designer fully informed. Copy of a bar chart schedule annotated to show the current progress shall be submitted by the Contractor(s) to the designer, along with monthly request for payment. For project requiring CPM schedule, the Contractor shall submit a biweekly report of the status of all activities. The bar chart schedule or status report shall show the actual Work completed to date in comparison with the original Work scheduled for all activities. If any activities of the work of several contractors are behind schedule, the contractor must indicate in writing, what measures will be taken to bring each such activity back on schedule and to ensure that the Contract Completion Date is not exceeded. A plan of action and recovery schedule shall be developed and submitted to the designer by the Project Expediter, when (1) the contractor's report indicates delays, that are in the opinion of the designer or the owner, of sufficient magnitude that the contractor's ability to complete the work by the scheduled completion is brought into question; (2) the updated construction schedule is thirty (30) days behind the planned or baseline schedule and no legitimate time extensions, as determined by the Designer, are in process; and (3) the contractor desires to make changes in the logic (sequencing of work) or the planned duration of future activities of the CPM schedule which, in the opinion of the designer or the owner, are of a major nature. The plan of action, when required shall be submitted to the Owner for review within two (2) business days of the Contractor receiving the Owner's written demand. The recovery schedule, when required, shall be submitted to the Owner within five (5) calendar days of the Contractor's receiving the Owner's written demand. Failure to provide an updated construction schedule or a recovery schedule may be grounds for rejection of payment applications or withholding of funds as set forth in Article 33.

k. The Project Expediter shall notify each contractor of such events or time frames that are critical to the progress of the job. Such notice shall be timely and reasonable. Should the progress be delayed due to the work of any of the several contractors, it shall be the duty of the Project Expediter to immediately notify the contractor(s) responsible for such delay, the designer, the State Construction Office and other prime contractors. The designer shall determine the contractor(s) who caused the delays and notify the bonding company of the responsible contractor(s) of the delays; and shall make a recommendation to the owner regarding further action.

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

responsibility of the other contractors involved in the project. The project expeditor's Superintendent(s) shall be in attendance at the Project site at all times when work is in progress unless conditions are beyond the control of the Contractor or until termination of the Contract in accordance with the Contract Documents. It is understood that such Superintendent shall be acceptable to the Owner and Designer and shall be the one who will be continued in that capacity for the duration of the project unless he ceases to be on the Contractor's payroll or the Owner otherwise agrees. The Superintendent shall not be employed on any other project for or by the Contractor or by any other entity during the course of the Work. If the Superintendent is employed by the Contractor on another project without the Owner's approval, then the Owner may deduct from the Contractor's monthly general condition costs and amount representing the Superintendent's cost and shall deduct that amount for each month thereafter until the Contractor has the Superintendent back on the Owner's Project full-time.

ARTICLE 15 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS

a. Effective from January 1, 2002, Chapter 143, Article 8, was amended, to allow public contracts to be delivered by the following delivery methods: single-prime, dual (single-prime and separate-prime), construction manager at risk, and alternative contracting method as approved by the State Building Commission. The owner reserves the right to prepare separate specifications, receive separate bids, and award separate contracts for such other major items of work as may be in the best interest of the State. For the purposes of a single prime contract, refer to Article 1 – Definitions.

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

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

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

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

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

ARTICLE 16 - SUBCONTRACTS AND SUBCONTRACTORS

a. Within thirty (30) days after award of the contract, the contractor shall submit to the designer, owner and to the State Construction Office a list giving the names and addresses of subcontractors and equipment and material suppliers he proposes to use, together with the scope of their respective parts of the work. Should any subcontractor be disapproved by the designer or owner, the designer or owner shall submit his reasons for disapproval in writing to the State Construction Office for its consideration with a copy to the contractor. If the State Construction Office concurs with the designer's or owner's recommendation, the contractor shall submit a substitute for approval. The designer and owner shall act promptly in the approval of subcontractors, and when approval of the list is given, no changes of subcontractors will be permitted except for cause or reason considered justifiable by the designer or owner.

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

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

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

ARTICLE 17 - CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

The contractor agrees that the terms of these contract documents shall apply equally to each subcontractor as to the contractor, and the contractor agrees to take such action as may be necessary to bind each subcontractor to these terms. The contractor further agrees to conform to the Code of Ethical Conduct as adopted by the Associated General Contractors of America, Inc., with respect to contractor-subcontractor relationships, and that payments to subcontractors shall be made in accordance with the provisions of G.S. 143-134.1 titled Interest on final payments due to prime contractors: payments to subcontractors.

a. On all public construction contracts which are let by a board or governing body of the state government or any political subdivision thereof, except contracts let by the Department of Transportation pursuant to G.S. 136-28.1, the balance due prime contractors shall be paid in full within 45 days after respective prime contracts of the project have been accepted by the owner, certified by the architect, engineer or designer to be completed in accordance with terms of the plans and specifications, or occupied by the owner and used for the purpose for which the project was constructed, whichever occurs first. Provided, however, that whenever the architect or consulting engineer in charge of the project determines that delay in completion of the project in accordance with terms of the plans and specifications is the fault of the contractor, the project may be occupied and used for the purposes for which it was constructed without payment of any interest on amounts withheld past the 45 day limit. No payment shall be delayed because of the failure of another prime contractor on such project to complete his contract. Should final payment to any prime contractor beyond the date such contracts have been certified to be completed by the designer or architect, accepted by the owner, or occupied by the owner and used for the purposes for which the project was constructed, be delayed by more than 45 days, said prime contractor shall be paid interest, beginning on the 46th day, at the rate of one percent (1%) per month or fraction thereof unless a lower rate is

agreed upon on such unpaid balance as may be due. In addition to the above final payment provisions, periodic payments due a prime contractor during construction shall be paid in accordance with the payment provisions of the contract documents or said prime contractor shall be paid interest on any such unpaid amount at the rate stipulated above for delayed final payments. Such interest shall begin on the date the payment is due and continue until the date on which payment is made. Such due date may be established by the terms of the contract. Funds for payment of such interest on state-owned projects shall be obtained from the current budget of the owning department, institution or agency. Where a conditional acceptance of a contract exists, and where the owner is retaining a reasonable sum pending correction of such conditions, interest on such reasonable sum shall not apply.

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

c. The percentage of retainage on payments made by the prime contractor to the subcontractor shall not exceed the percentage of retainage on payments made by the owner to the prime contractor. Any percentage of retainage on payments made by the prime contractor to the subcontractor that exceeds the percentage of retainage on payments made by the owner to the prime contractor shall be subject to interest to be paid by the prime contractor to the subcontractor at the rate of one percent (1%) per month or fraction thereof.

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

ARTICLE 18 - DESIGNER'S STATUS

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

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

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

d. The designer and his consultants will make inspections of the project. He will inspect the progress, the quality and the quantity of the work.

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

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

ARTICLE 19 - CHANGES IN THE WORK

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

b. Except in an emergency endangering life or property, no change shall be made by the contractor except upon receipt of approved_change order or written field order from the designer, countersigned by the owner and the state construction office authorizing such change. No claim for adjustments of the contract price shall be valid unless this procedure is followed.

A field order, transmitted by fax, electronically, or hand delivered, may be used where the change involved impacts the critical path_of the work. A formal change order shall be issued as expeditiously as possible.

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

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

1. Where the extra work involved is covered by unit prices quoted in the proposal, or subsequently agreed to by the Contractor, Designer, Owner and State Construction Office the value of the change shall be computed by application of unit prices based on quantities, estimated or actual as agreed of the items involved, except in such cases where a quantity exceeds the estimated quantity allowance in the contract by one hundred percent (100%) or more. In such cases, either party may elect to proceed under subparagraph c2 herein. If neither party elects to proceed under c2, then unit prices shall apply.

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

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

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

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

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

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

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

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

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

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

g. In all change orders, the procedure will be for the designer to request proposals for the change order work in writing. The contractor will provide such proposal and supporting data in suitable format. The designer shall verify correctness. Delay in the processing of the change order due to lack of proper submittal by the contractor of all required supporting data shall not constitute grounds for a time extension or basis of a claim. Within fourteen (14) days after receipt of the contractor's accepted proposal including all supporting documentation required by the designer, the designer shall prepare the change order and forward to the contractor for his signature or otherwise respond, in writing, to

the contractor's proposal. Within seven (7) days after receipt of the change order executed_by the contractor, the designer shall, certify the change order by his signature, and forward the change order and all supporting data to the owner for the owner's signature. The owner shall execute the change order and forward to the State Construction Office for final approval, within seven (7) days of receipt. The State Construction Office shall act on the change order within seven (7) days. In case of emergency or extenuating circumstances, approval of changes may be obtained verbally by telephone or field orders approved by all parties, then shall be substantiated in writing as outlined under normal procedure.

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

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

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

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

ARTICLE 20 - CLAIMS FOR EXTRA COST

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

b. The contractor shall not act on instructions received by him from persons other than the designer, and any claims for extra compensation or extension of time on account of such instruction will not be honored. The designer shall not be responsible for misunderstandings claimed by the contractor of verbal instructions which have not been confirmed in writing, and in no case shall instructions be interpreted as permitting a departure from the contract documents unless such instruction is confirmed in writing and supported by a properly authorized change order.

c. Should a claim for extra compensation that complies with the requirements of (a) above by the contractor and is denied by the designer or owner, and cannot be resolved by a

representative of the State Construction Office, the contractor may request a mediation in connection with GS 143-128(f1) in the dispute resolution rules adopted by the State Building Commission (1 N.C.A.C. 30H .0101 through .1001). If the contractor is unable to resolve its claim as a result of mediation, the contractor may pursue the claim in accordance with the provisions of G.S. 143-135.3, or G.S. 143-135.6 where Community Colleges are the owner,and the following:

1. A contractor who has not completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The director may deny, allow or compromise the claim, in whole or in part. A claim under this subsection is not a contested case under Chapter 150B of the General Statutes.

2. (a) A contractor who has completed a contract with a board for construction or repair work and who has not received the amount he claims is due under the contract may submit a verified written claim to the director of the State Construction Office of the Department of Administration for the amount the contractor claims is due. The claim shall be submitted within sixty (60) days after the contractor receives a final statement of the board's disposition of his claim and shall state the factual basis for the claim.

   (b) The director shall investigate a submitted claim within ninety (90) days of receiving the claim, or within any longer time period upon which the director and the contractor agree. The contractor may appear before the director, either in person or through counsel, to present facts and arguments in support of his claim. The director may allow, deny or compromise the claim, in whole or in part. The director shall give the contractor a written statement of the director's decision on the contractor's claim.

   (c) A contractor who is dissatisfied with the director's decision on a claim submitted under this subsection may commence a contested case on the claim under Chapter 150B of the General Statutes. The contested case shall be commenced within sixty (60) days of receiving the director's written statement of the decision.

   (d) As to any portion of a claim that is denied by the director, the contractor may, in lieu of the procedures set forth in the preceding subsection of this section, within six (6) months of receipt of the director's final decision, institute a civil action for the sum he claims to be entitled to under the contract by filing a verified complaint and the issuance of a summons in the Superior Court of Wake County or in the superior court of any county where the work under the contract was performed. The procedure shall be the same as in all civil actions except that all issues shall be tried by the judge, without a jury.

ARTICLE 21 - MINOR CHANGES IN THE WORK

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

ARTICLE 22 - UNCORRECTED FAULTY WORK

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

ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSION OF TIME

a. The time of completion is stated in the Supplementary General Conditions and in the Form of Construction Contract. The Project Expediter, upon notice of award of contract, shall prepare a construction schedule to complete the project within the time of completion as required by Article 14.

b. The contractors shall commence work to be performed under this agreement on a date to be specified in a written Notice to Proceed from the designer and shall fully complete all work hereunder within the time of completion stated. Time is of the essence and the contractor acknowledges the Owner will likely suffer financial damage for failure to complete the work within the time of completion. For each day in excess of the above number of days, the contractor(s) shall pay the owner the sum stated as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the owner by reason of failure of said contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.

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

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

   Time extensions will not be granted for rain, wind, snow or other natural phenomena of normal intensity for the locality where work is performed. For purpose of determining extent of delay attributable to unusual weather phenomena, a determination shall be made by comparing the weather for the contract period involved with the average of the preceding five (5) year climatic range during the same time interval based on the National Oceanic and Atmospheric Administration National Weather Service statistics for the locality where work is performed and on daily weather logs kept on the job site by the contractor reflecting the effect of the weather on progress of the work and initialed by the designer's representative. No weather delays shall be considered after the building is dried in unless work claimed to be delayed is on the critical path of the baseline schedule or approved updated schedule. Time extensions for weather delays, acts of God, labor disputes, fire, delays in transportation, unavoidable casualties or other delays which are beyond the control of the Owner do not entitle the Contractor to compensable damages for delays. Any contractor claim for compensable damages for delays is limited to delays caused solely by the owner or its agents. Contractor caused delays shall be accounted for before owner or designer caused delays in the case of concurrent delays.

e. Request for extension of time shall be made in writing to the designer, copies to the owner and SCO, within twenty (20) days following cause of delay. In case of continuing cause for delay, the Contractor shall notify the_Designer to the designer, copies to the owner and SCO, of the delay within 20 days of the beginning of the delay and only one claim is necessary.

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

g. No claim for time extension shall be allowed on account of failure of the designer to furnish drawings or instructions until twenty (20) days after demand for such drawings and/or instructions. See Article 5c. Demand must be in written form clearly stating the potential for delay unless the drawings or instructions are provided. Any delay granted will begin after the twenty (20) day demand period is concluded.

ARTICLE 24 - PARTIAL UTILIZATION/BENEFICIAL OCCUPANCY

a. The owner may desire to occupy or utilize all or a portion of the project prior to the completion of the project.

b. Should the owner request a utilization of a building or portion thereof, the designer shall perform a designer final inspection of area after being notified by the contractor that the area is ready for such. After the contractor has completed designer final inspection punch list and the designer has verified, then the designer shall schedule a beneficial occupancy inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office. If beneficial occupancy is granted by the State Construction Office, in such areas the following will be established:

   1. The beginning of guarantees and warranties period for the equipment necessary to support. in the area.

   2. The owner assumes all responsibiliites for utility costs for entire building.

   2. Contractor will obtain consent of surety.

   3. Contractor will obtain endorsement from insurance company permitting beneficial occupancy.

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

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

ARTICLE 25 - FINAL INSPECTION, ACCEPTANCE, AND PROJECT CLOSEOUT

a. Upon notification from the contractor(s) that the project is complete and ready for inspection, the designer shall make a Designer final inspection to verify that the project is complete and ready for SCO final inspection. Prior to SCO final inspection, the contractor(s) shall complete all items requiring corrective measures noted at the Designer

final inspection. The designer shall schedule a SCO final inspection at a time and date acceptable to the owner, contractor(s) and State Construction Office.

b. At the SCO final inspection, the designer and his consultants shall, if job conditions warrant, record a list of items that are found to be incomplete or not in accordance with the contract documents. At the conclusion of the SCO final inspection, the designer and State Construction Office representative shall make one of the following determinations:

   1. That the project is completed and accepted.

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

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

c. Within fourteen (14) days of final acceptance per Paragraph b1 or within fourteen (14) days after completion of punch list per Paragraph b2 above, the designer shall certify the work and issue applicable certificate(s) of compliance.

d. Any discrepancies listed or discovered after the date of SCO final inspection and acceptance under Paragraphs b1 or b2 above shall be handled in accordance with Article 42, Guarantee.

f. The final acceptance date will establish the following:

   1. The beginning of guarantees and warranties period.

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

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

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

g. Prior to issuance of final acceptance date, the contractor shall have his authorized representatives visit the project and give full instructions to the designated personnel regarding operating, maintenance, care, and adjustment of all equipment and special construction elements. In addition, the contractor shall provide to the owner a complete instructional video (media format acceptable to the owner) on the operation, maintenance, care and adjustment of all equipment and special construction elements.

ARTICLE 26 - CORRECTION OF WORK BEFORE FINAL PAYMENT

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

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

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

ARTICLE 27 - CORRECTION OF WORK AFTER FINAL PAYMENT

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

ARTICLE 28 - OWNER'S RIGHT TO DO WORK

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

ARTICLE 29 - ANNULMENT OF CONTRACT

If the contractor fails to begin the work under the contract within the time specified, or the progress of the work is not maintained on schedule, or the work is not completed within the time above specified, or fails to perform the work with sufficient workmen and equipment or with sufficient materials to ensure the prompt completion of said work, or shall perform the work unsuitably or shall discontinue the prosecution of the work, or if the contractor shall become insolvent or be declared bankrupt or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against him unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the work in an acceptable manner, the owner may give notice in writing, sent by certified mail, return receipt requested, to the contractor and his surety of such delay, neglect or default, specifying the same, and if the contractor within a period of seven (7) days after such notice shall not proceed in accordance therewith, then the owner shall, declare this contract in default, and, thereupon, the surety shall promptly take over the work and complete the performance of this contract in the manner and within the time frame specified. In the event the surety shall fail to take over the work to be done under this contract within seven (7) days after being so notified and notify the owner in writing, sent by certified mail, return receipt requested, that he is taking the same over and stating that he will diligently pursue and complete the same, the owner shall have full power and authority, without violating the contract, to take the prosecution of the work out of the hands of said contractor, to appropriate or use any or all contract materials and equipment on the grounds as may be suitable and acceptable and may enter into an agreement, either by public letting or negotiation, for the completion of said contract according to the terms and provisions thereof

or use such other methods as in his opinion shall be required for the completion of said contract in an acceptable manner. All costs and charges incurred by the owner, together with the costs of completing the work under contract, shall be deducted from any monies due or which may become due said contractor and surety. In case the expense so incurred by the owner shall be less than the sum which would have been payable under the contract, if it had been completed by said contractor, then the said contractor and surety shall be entitled to receive the difference, but in case such expense shall exceed the sum which would have been payable under the contract, then the contractor and the surety shall be liable and shall pay to the owner the amount of said excess.

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

a. Should the work be stopped by order of a court having jurisdiction, or by order of any other public authority for a period of three months, due to cause beyond the fault or control of the contractor, or if the owner should fail or refuse to make payment on account of a certificate issued by the designer within forty-five (45) days after receipt of same, then the contractor, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the owner and the designer, may suspend operations on the work or terminate the contract.

b. The owner shall be liable to the contractor for the cost of all materials delivered and work performed on this contract plus 10 percent overhead and profit and shall make such payment. The designer shall be the judge as to the correctness of such payment.

ARTICLE 31 - REQUEST FOR PAYMENT

a. Not later than the fifth day of the month, the contractor shall submit to the designer a request for payment for work done during the previous month. The request shall be in the form agreed upon between the contractor and the designer, but shall show substantially the value of work done and materials delivered to the site during the period since the last payment, and shall sum up the financial status of the contract with the following information:

   1. Total of contract including change orders.

   2. Value of work completed to date.

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

   4. Less previous payments.

   5. Current amount due.

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

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

value of each subcontractor and supplier, identifying each minority business subcontractor and supplier as listed in Affidavit C, if applicable.

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

e. In the event of beneficial occupancy, retainage of funds due the contractor(s) may be reduced with the approval of the State Construction Office to an equitable amount to cover the list of items to be completed or corrected. Retainage may not be reduced to less than two and one-half (2 1/2) times the estimated value of the work to be completed or corrected. Reduction of retainage must be with the consent and approval of the contractor's bonding company.

ARTICLE 32 - CERTIFICATES OF PAYMENT AND FINAL PAYMENT

a. Within five (5) days from receipt of request for payment from the contractor, the designer shall issue and forward to the owner a certificate for payment. This certificate shall indicate the amount requested or as approved by the designer. If the certificate is not approved by the designer, he shall state in writing to the contractor and the owner his reasons for withholding payment.

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

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

   2. Faulty work or materials appearing after final payment.

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

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

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

d. Prior to submitting request for final payment to the designer for approval, the contractor shall fully comply with all requirements specified in the" project closeout" section of the specifications. These requirements include but not limited to the following:

1. Submittal of Product and Operating Manuals, Warranties and Bonds, Guarantees, Maintenance Agreements, As-Built Drawings, Certificates of Inspection or Approval from agencies having jurisdiction. (The designer must approve the Manuals prior to delivery to the owner).

2. Transfer of Required attic stock material and all keys in an organized manner.

3. Record of Owner's training.

4. Resolution of any final inspection discrepancies.

5. Granting access to Contractor's records, if Owner's internal auditors have made a request for such access pursuant to Article 52.

e. The contractor shall forward to the designer, the final application for payment along with the following documents:

1. List of minority business subcontractors and material suppliers showing breakdown of contract amounts and total actual payments to subs and material suppliers.

2. Affidavit of Release of Liens.

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

4. Consent of Surety to Final Payment.

5. Certificates of state agencies required by state law.

f. The designer will not authorize final payment until the work under contract has been certified by designer, certificates of compliance issued, and the contractor has complied with the closeout requirements. The designer shall forward the contractor's final application for payment to the owner along with respective certificate(s) of compliance required by law.

ARTICLE 33 - PAYMENTS WITHHELD

a. The designer with the approval of the State Construction Office may withhold payment for the following reasons:

1. Faulty work not corrected.

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

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

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

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

2. Evidence that subcontractors have not been paid.

c. The Owner may withhold all or a portion of Contractor's general conditions costs set forth in the approved schedule of values, if Contractor has failed to comply with: (1) a request to access its records by Owner's internal auditors pursuant to Article 52; (2) a request for a plan of action and/or recovery schedule under Article 14.j or provide The Owner; (3) a request to provide an electronic copies of Contractor's baseline schedule, updates with all logic used to create the schedules in the original format of the scheduling software; and (4) Contractor's failure to have its Superintendent on the Project full-time; (

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

ARTICLE 34 - MINIMUM INSURANCE REQUIREMENTS

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

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

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

b. **Public Liability and Property Damage**

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

anyone directly or indirectly employed by either of them and the minimum limits of such insurance shall be as follows:

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

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

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

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

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

d. **Deductible**

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

e. **Other Insurance**

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

f. **Proof of Carriage**

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

ARTICLE 35 - PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 36 - CONTRACTOR'S AFFIDAVIT

The final payment of retained amount due the contractor on account of the contract shall not become due until the contractor has furnished to the owner through the designer an affidavit signed, sworn and notarized to the effect that all payments for materials, services or subcontracted work in connection with his contract have been satisfied, and that no claims or

liens exist against the contractor in connection with this contract. In the event that the contractor cannot obtain similar affidavits from subcontractors to protect the contractor and the owner from possible liens or claims against the subcontractor, the contractor shall state in his affidavit that no claims or liens exist against any subcontractor to the best of his (the contractor's) knowledge, and if any appear afterward, the contractor shall save the owner harmless.

ARTICLE 37 - ASSIGNMENTS

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

ARTICLE 38 - USE OF PREMISES

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

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

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

d. No firearms, any type of alcoholic beverages, or drugs (other than those prescribed by a physician) will be permitted at the job site.

ARTICLE 39 - CUTTING, PATCHING AND DIGGING

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

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

c. No contractor shall endanger any work of another contractor by cutting, digging or other means. No contractor shall cut or alter the work of any other contractor without the consent of the designer and the affected contractor(s).

ARTICLE 40 - UTILITIES, STRUCTURES, SIGNS

a. The contractor shall provide necessary and adequate facilities for water, electricity, gas, oil, sewer and other utility services which maybe necessary and required for completion of the project including all utilities required for testing, cleaning, balancing, and sterilization of designated plumbing, mechanical and electrical systems. Any permanent meters installed shall be listed in the contractor's name until work has a final acceptance. The contractor will be solely responsible for all utility costs prior to final acceptance. Contractor shall contact all affected utility companies prior to bid to determine their requirements to provide temporary and permanent service and include all costs associated with providing those services in their bid. Coordination of the work of the utility companies during construction is the sole responsibility of the contractor.

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

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

d Prior to the operation of permanent systems, the Project Expediter will provide temporary power, lighting, water, and heat to maintain space temperature above freezing, as required for construction operations.

e. All contractors shall have the permanent building systems in sufficient readiness for furnishing temporary climatic control at the time a building is enclosed and secured. The HVAC systems shall maintain climatic control throughout the enclosed portion of the building sufficient to allow completion of the interior finishes of the building. A building shall be considered enclosed and secured when windows, doorways (exterior, mechanical, and electrical equipment rooms), and hardware are installed; and other openings have protection which will provide reasonable climatic control. The appropriate time to start the mechanical systems and climatic condition shall be jointly determined by the contractor(s), the designer and owner. Use of the equipment in this manner shall be subject to the approval of the Designer and owner and shall in no way affect the warranty requirements of the contractor(s).

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

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

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

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

2. Temporary filters as recommended by the equipment manufacturer in order to keep the equipment and ductwork clean and free of dust and debris shall be installed in each of the heating and air conditioning units and at each return grille during construction. New filters shall be installed in each unit prior to the owner's acceptance of the work.

3. Extra effort shall be maintained to keep the building and the site adjacent to the building clean and under no circumstances shall air systems be operated if finishing and site work operations are creating dust in excess of what would be considered normal if the building were occupied.

4. It shall be understood that any warranty on equipment presented to the owner shall extend from the day of final acceptance by the owner. The cost of warranting the

equipment during operation in the finishing stages of construction shall be borne by the contractor whose system is utilized.

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

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

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

k. On multi-story construction projects, the Project Expediter shall provide temporary elevators, lifts, or other special equipment for the general use of all contractors. The cost for such elevators, lifts or other special equipment and the operation thereof shall be included in the Project Expediter's bid.

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

ARTICLE 41 - CLEANING UP

a. The contractors shall keep the building and surrounding area reasonably free from rubbish at all times, and shall remove debris from the site on a timely basis or when directed to do so by the designer or Project Expediter. The Project Expediter shall provide an on site refuse container(s) for the use of all contractors. Each contractor shall remove their rubbish and debris from the building on a daily basis. The Project Expediter shall broom clean the building as required to minimize dust and dirt accumulation.

b. The Project Expediter shall provide and maintain suitable all-weather access to the building.

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

ARTICLE 42 - GUARANTEE

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

b. Where items of equipment or material carry a manufacturer's warranty for any period in excess of twelve (12) months, then the manufacturer's warranty shall apply for that particular piece of equipment or material. The contractor shall replace such defective equipment or materials, without cost to the owner, within the manufacturer's warranty period.

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

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

ARTICLE 43 - CODES AND STANDARDS

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

ARTICLE 44 - INDEMNIFICATION

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

ARTICLE 45 - TAXES

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

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

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

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

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

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

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

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

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

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

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

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

Similar certified statements by his subcontractors must be obtained by the general contractor and furnished to the claimant.
Contractors are not to include any tax paid on supplies, tools and equipment which they use to perform their contracts and should include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure.

ARTICLE 46 - EQUAL OPPORTUNITY CLAUSE

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

ARTICLE 47 - EMPLOYMENT OF INDIVIDUALS WITH DISABILITIES

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

ARTICLE 48 - ASBESTOS-CONTAINING MATERIALS (ACM)

The State of North Carolina has attempted to address all asbestos-containing materials that are to be disturbed in the project. However, there may be other asbestos-containing materials in the work areas that are not to be disturbed and do not create an exposure hazard.

Contractors are reminded of the requirements of instructions under Instructions to Bidders and General Conditions of the Contract, titled Examination of Conditions. Statute 130A, Article 19, amended August 3, 1989, established the Asbestos Hazard Management Program that controls asbestos abatement in North Carolina. The latest edition of *Guideline Criteria for Asbestos Abatement* from the State Construction Office is to be incorporated in all asbestos abatement projects for the Capital Improvement Program.

ARTICLE 49 - MINORITY BUSINESS PARTICIPATION

GS 143-128.2 establishes a ten percent (10%) goal for participation by minority businesses in total value of work for each State building project. The document, *Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts* including Affidavits and Appendix E are hereby incorporated into and made a part of this contract.

ARTICLE 50 – CONTRACTOR EVALUATION

The contractor's overall work performance on the project shall be fairly evaluated in accordance with the State Building Commission policy and procedures, for determining qualifications to bid on future State capital improvement projects. In addition to final evaluation, interim evaluation may be prepared during the progress of project. The document, Contractor Evaluation Procedures, is hereby incorporated and made a part of this contract. The owner may request the contractor's comments to evaluate the designer.

ARTICLE 51 – GIFTS

Pursuant to N.C. Gen. Stat. § 133-32, it is unlawful for any vendor or contractor (i.e. architect, bidder, contractor, construction manager, design professional, engineer, subcontractor, supplier, vendor, etc.), to make gifts or to give favors to any State employee. This prohibition covers those vendors and contractors who: (1) have a contract with a governmental agency; or (2) have performed under such a contract within the past year; or (3) anticipate bidding on such a contract in the future. For additional information regarding the specific requirements and exemptions, vendors and contractors are encouraged to review G.S. Sec. 133-32.

During the construction of the Project, the Contractor is prohibited from making gifts to any of the Owner's employees, Owner's project representatives (architect, engineers, construction manager and their employees), employees of the State Construction Office and/or any other State employee that may have any involvement, influence, responsibilities, oversight, management and/or duties that pertain to and/or relate to the contract administration, financial administration and/or disposition of claims arising from and/or relating to the Contract and/or Project.

ARTICLE 52 – AUDITING-ACCESS TO PERSONS AND RECORDS

In accordance with N.C. General Statute 147-64.7, the State Auditor shall have access to Contractor's officers, employees, agents and/or other persons in control of and/or responsible for the Contractor's records that relate to this Contracts for purposes of conducting audits under the referenced statute. The Owner's internal auditors shall also have the right to access and copy the Contractor's records relating to the Contract and Project during the term of the Contract and within two years following the completion of the Project/close-out of the Contract to verify accounts, accuracy, information, calculations and/or data affecting and/or

relating to Contractor's requests for payment, requests for change orders, change orders, claims for extra work, requests for time extensions and related claims for delay/extended general conditions costs, claims for lost productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, and/or any other type of claim for payment or damages from Owner and/or its project representatives.

ARTICLE 53 – NORTH CAROLINA FALSE CLAIMS ACT

The North Carolina False Claims Act ("NCFCA"), N.C Gen. Stat. § 1-605 through 1-618, applies to this Contract. The Contractor should familiarize itself with the entire NCFCA and should seek the assistance of an attorney if it has any questions regarding the NCFCA and its applicability to any requests, demands and/or claims for payment its submits to the State through the contracting state agency, institution, university or community college.

The purpose of the NCFCA "is to deter persons from knowingly causing or assisting in causing the State to pay claims that are false or fraudulent and to provide remedies in the form of treble damages and civil penalties when money is obtained from the State by reason of a false or fraudulent claim." (Section 1-605(b).) A contractor's liability under the NCFCA may arise from, but is not limited to: requests for payment, invoices, billing, claims for extra work, requests for change orders, requests for time extensions, claims for delay damages/extended general conditions costs, claims for loss productivity, claims for loss efficiency, claims for idle equipment or labor, claims for price/cost escalation, pass-through claims of subcontractors and/or suppliers, documentation used to support any of the foregoing requests or claims, and/or any other request for payment from the State through the contracting state agency, institution, university or community college. The parts of the NCFCA that are most likely to be enforced with respect to this type of contract are as follows:

- A "claim" is "[a]ny request or demand, whether under a contract or otherwise, for money or property and whether or not the State has title to the money or property that (i) is presented to an officer, employee, or agent of the State or (ii) is made to a contractor ... if the money or property is to be spent or used on the State's behalf or to advance a State program or interest and if the State government: (a) provides or has provided any portion of the money or property that is requested or demanded; or (b) will reimburse such contractor ... for any portion of the money or property which is requested or demanded." (Section 1-606(2).)

- "Knowing" and "knowingly." – Whenever a person, with respect to information, does any of the following: (a) Has actual knowledge of the information; (b) Acts in deliberate ignorance of the truth or falsity of the information; and/or (c) Acts in reckless disregard of the truth or falsity of the information. (Section 1-606(4).) Proof of specific intent to defraud is not required. (Section 1-606(4).)

- "Material" means having a natural tendency to influence, or be capable of influencing, the payment or receipt of money or property. (Section 1-606(4).)

- Liability. – "Any person who commits any of the following acts shall be liable to the State for three times the amount of damages that the State sustains because of the act of that person[:] ... (1) Knowingly presents or causes to be presented a false or fraudulent claim for payment or approval. (2) Knowingly makes, uses, or causes to be made or used, a false record or statement material to a false or fraudulent claim. (3) Conspires to commit a violation of subdivision (1), (2) ..." (Section 1-607(a)(1), (2).)

- The NCFCA shall be interpreted and construed so as to be consistent with the federal False Claims Act, 31 U.S.C. § 3729, et seq., and any subsequent amendments to that act. (Section 1-616(c).)

Finally, the contracting state agency, institution, university or community college may refer any suspected violation of the NCFCA by the Contractor to the Attorney General's Office for investigation. Under Section 1-608(a), the Attorney General is responsible for investigating any violation of NCFCA, and may bring a civil action against the Contractor under the NCFCA. The Attorney General's investigation and any civil action relating thereto are independent and not subject to any dispute resolution provision set forth in this Contract. (See Section 1-608(a).)

ARTICLE 54 – TERMINATION FOR CONVENIENCE

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

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

SECTION 00 0810
SUPPLEMENTARY INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS OF THE CONTRACT

RELATION TO STANDARD FORMS

The Supplementary Instructions to Bidders and General Conditions of the Contract contain changes and additions to the "Instructions to Bidders and General Conditions of the Contract, Standard Form for Construction Projects, State Construction Office, North Carolina Department of Administration", Form OC-15, Twenty-Fourth Edition, Revised January 2013. Where any portion of an Article in this document is modified or voided by the Supplementary General Condition, the unaltered provisions shall remain in effect.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

12 – SUBSTITUTIONS

Add sentence to the paragraph to read:

An addendum will be issued at least 7 days prior to the bid date, listing all approved substitutions. After the issuance of the substitution addendum no further product substitutions will be made except under extenuating circumstances, etc.

SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT

ARTICLE 1 - DEFINITIONS

Amend Article 1, Paragraph "b" to read as follows:

"The Owner for the Project is the North Carolina Department of Transportation:

Amend Article 1, Paragraph "c" to read as follows:

"The Designer of Record is Burnette • Chalk Architecture & Planning, P.A., Morehead City, NC, with Consulting Engineers as indicated on the Construction Documents.

ARTICLE 6 – WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE

Article 6, Paragraph "a":

At the end of the first sentence, add the words "… addenda and bulletin drawings"

Add to Article 6, Paragraph "d" as follows:

d. Certification of final payment request will not be made by the Owner until record documents have been received from the Contractor.

ARTICLE 14 – CONSTRUCTION SUPERVISION & SCHEDULE

Add the following to the end of Article 14, Paragraph "d":

"… A preconstruction conference shall be held on site as soon as practical after the Construction contract is awarded."

Modify Article 14, Paragraph "e" where "registered land surveyor **in the State of North Carolina**"…

Delete the second sentence of Article 14, Paragraph "f" and substitute the following:

For this project the Single Prime Contractor (General Contractor) shall be designated as the "Project Expediter".

ARTICLE 23 – TIME OF COMPLETION, DELAYS, EXTENSION OF TIME

Change Article 23, Paragraph "b" to read:

"The contractors shall commence work to be performed under this agreement on a date to be specified in a written order from the Owner and shall complete all work hereunder within **300 consecutive calendar days** of said date. For each day in excess of the above number of days, the Contractor(s) shall pay the Owner **One Thousand dollars ($1,000.00)** as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof."

Add the following at the end of Article 23, Paragraph "d":

"The project expediter will maintain a day-to-day record of site weather conditions for each month of the construction period. The preceding month's record will be presented to the Designer at each Monthly Jobsite Progress Conference. This does not negate the climatological weather data requirements above"

ARTICLE 31 – REQUEST FOR PAYMENTS

Delete the first sentence and substitute the following:

"The Contractor shall submit to the Designer a Schedule of Values for review at least three weeks prior to the first payment request. The Contractor shall them submit to the Designer a request for payment for work done each previous month. The request for payment shall be submitted in time for the Designer's review on the date of the monthly construction progress conference. The form of Application for Payment shall be the State of North Carolina's "Application and Certificate for Payment", with supporting information on AIA form G703, latest edition".

Change the first part of the second sentence of Article 31, Paragraph "a" to read:

The request shall be on the AIA Document G702 standard form for Application and Certificate for Payment supplemented by the Continuation sheet, AIA Document (G703 and shall show . . . the following information:

ARTICLE 33 – PAYMENTS WITHHELD

Add item to Article 33, Paragraph "a.4" as follows:

"Failure to submit Applications for Payment for review on or before the date of the monthly construction progress conference."

ARTICLE 34 – MINIMUM INSURANCE REQUIREMENTS

Add the following to Article 34, subparagraph under paragraph "c":

"The Contractor shall purchase and maintain property insurance during the life of this Contract, upon the entire work at the site to the full insurable value thereof. The insurance shall include the interests of the Owner, the Contractor, the subcontractors and subsubcontractors in the work and shall insure against risks of direct physical loss (all perils)

If the Owner is damaged by failure of the Contractor to purchase or maintain such insurance, then the Contractor shall bear all reasonable costs properly attributable thereto; the Contractor shall effect and maintain similar property insurance on portions of the work stored off-site when request for payment per articles so incudes such portions"

ARTICLE 40 - UILITIES, STRUCTURES, SIGNS

Change the third sentence of Article 40, Paragraph "a" to read:

a. The Project Expediter shall pay all utility costs.

Delete the first three (3) sentences of Article 40, paragraph "l" and replace with the following:

l. The Project Expediter will erect one sign on the project at a location to be determined by the Owner. The sign shall be as detailed in Section 10 4250 – "Signage", and shall be erected within 14 days of award of Contract.

ARTICLE 42 – GUARANTEE

Add to Article 42, Paragraph "d" to rea :

The CONTRACTOR shall warrant the materials and workmanship of the roofing system against leakage and against defects due to faulty materials, workmanship, and contractor negligence for a period of five (5) years following acceptance of the project by the owner. Additionally, the roofing materials shall have a 20 year warranty covering defects in workmanship and materials per Section 07 4113 – Metal Roof Panels"

ARTICLE 49 – MINORITY BUSINESS PARTICIPATION

The MBE Guidelines (GS143-128.2 - Effective 1/1/2002) follow the Supplementary General conditions and the MBE Appendices follow the Form of Proposal at the end of this manual.

ARTICLE 55 – INDEX OF DRAWINGS

Sheet No.	Contents
T1.0	Cover Sheet
T2.0	Building Code Summary: Appendix B
T2.1	Life Safety Plan
1 of 1	Existing Conditions Survey
C1 of 6	Site Plan
C2 of 6	Grading Plan
C3 of 6	Waters of the US Impact Map
C4 of 6	Utility Plan
C5 of 6	Vegetation Plan
C6 of 6	Details
SSD-2	CFPUA Sanitary Sewer
WSD-1	CFPUA Water Distribution System
A1.1	Floor Plan
A1.2	Reflected Ceiling Plan
A1.3	Roof Plan
A2.1	Exterior Elevations
A3.1	Building Sections
A3.2	Building Sections

A3.3	Wall Sections
A4.1	Door & Window Schedules & Details
A4.2	Room Finish Schedule
A4.3	Details
S1	Foundation Plan & Details
S2	Framing Plan & Framing Details
S3	Details & General Notes
P1 of 4	Plumbing Cover
P2 of 4	Plumbing DWV and Water Plan
P3 of 4	Plumbing Schedules & Details
P4 of 4	Plumbing Natural Gas & Isometric
M1 of 4	Mechanical Cover
M2 of 4	Mechanical Plan
M3 of 4	Mechanical Enlarged Plan & Sections
M4 of 4	Mechanical Details, Schedules, & Sequence of Operation
E1 of 6	Site Electrical & Lighting Plan & Riser
E2 of 6	Electrical Plan
E3 of 6	Communications & Security Plan
E4 of 6	Lighting Plan
E 5 of 6	Electrical Schedules
E6 of 6	Panel Schedules
E 6 of 7	Electrical Details

END OF SECTION 00 0810

GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN STATE CONSTRUCTION CONTRACTS

In accordance with G.S. 143-128.2 (effective January 1, 2002) these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager at risk, and alternative contracting methods, on State construction projects in the amount of $300,000 or more. The legislation provides that the State shall have a verifiable ten percent (10%) goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

SECTION A: INTENT

It is the intent of these guidelines that the State of North Carolina, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded shall cooperate and in good faith do all things legal, proper and reasonable to achieve the statutory goal of ten percent (10%) for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors or awarding authorities to award contracts or subcontracts to or to make purchases of materials or equipment from minority-business contractors or minority-business subcontractors who do not submit the lowest responsible, responsive bid or bids.

SECTION B: DEFINITIONS

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
   a. Black, that is, a person having origins in any of the black racial groups in Africa;
   b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
   c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
   d. American Indian, that is, a person having origins in any of the original peoples of North America; or
   e. Female

2. Minority Business - means a business:
   a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
   b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.

3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".

4. Public Entity - means State and all public subdivisions and local governmental units.

5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.

6. Designer – Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering, work.

7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.

9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.

10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

SECTION C: RESPONSIBILITIES

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office).

The HUB Office has established a program, which allows interested persons or businesses qualifying as a minority business under G.S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

a. Identify those areas of work for which there are minority businesses, as requested.
b. Make available to interested parties a list of prospective minority business contractors and subcontractors.
c. Assist in the determination of technical assistance needed by minority business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

(1) Maintain a current list of minority businesses. The list shall include the areas of work in which each minority business is interested.
(2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the State Construction Office and other public entities.
(3) Inform minority businesses of the contracting and subcontracting process for public construction building projects.
(4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects.
(5) The HUB Office also oversees the minority business program by:
    a. Monitoring compliance with the program requirements.
    b. Assisting in the implementation of training and technical assistance programs.
    c. Identifying and implementing outreach efforts to increase the utilization of minority businesses.
    d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. State Construction Office

The State Construction Office will be responsible for the following:

a. Furnish to the HUB Office a minimum of twenty-one days prior to the bid opening the following:
    (1) Project description and location;
    (2) Locations where bidding documents may be reviewed;
    (3) Name of a representative of the owner who can be contacted during the advertising period to advise who the prospective bidders are;
    (4) Date, time and location of the bid opening.
    (5) Date, time and location of prebid conference, if scheduled.

b. Attending scheduled prebid conference, if necessary, to clarify requirements of the general statutes regarding minority-business participation, including the bidders' responsibilities.

c. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal, that must be complied with, if the bid is to be considered as responsive, prior to award of contracts. The State reserves the right to reject any or all bids and to waive informalities.
d. Reviewing of minority business requirements at Preconstruction conference.
e. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
f. Provide statistical data and required reports to the HUB Office.
g. Resolve any protest and disputes arising after implementation of the plan, in conjunction with the HUB Office.

3. Owner
Before awarding a contract, owner shall do the following:

a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and non-minority businesses.
b. Attend the scheduled prebid conference.
c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the public entity for public construction or repair work and minority businesses that otherwise indicated to the Office for Historically Underutilized Businesses an interest in the type of work being bid or the potential contracting opportunities listed in the proposal. The notification shall include the following:
    1. A description of the work for which the bid is being solicited.
    2. The date, time, and location where bids are to be submitted.
    3. The name of the individual within the owner's organization who will be available to answer questions about the project.
    4. Where bid documents may be reviewed.
    5. Any special requirements that may exist.
d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought.
e. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award to the State Construction Office.
g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award to State Construction Office.
h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
i. Make documentation showing evidence of implementation of Owner's responsibilities available for review by State Construction Office and HUB Office, upon request

4. Designer
Under the single-prime bidding, separate prime bidding, construction manager at risk, or alternative contracting method, the designer will:

a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f) – (i.e. bidders' proposals for identification of the minority businesses that will be utilized with

corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.

e. During construction phase of the project, review "MBE Documentation for Contract Payment" – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the State Construction Office.
f. Make documentation showing evidence of implementation of Designer's responsibilities available for review by State Construction Office and HUB Office, upon request.

5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors
Under the single-prime bidding, the separate-prime biding, construction manager at risk and alternative contracting methods, contractor(s) will:

a. Attend the scheduled prebid conference.
b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work.
c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
   (1) A description of the work for which the subbid is being solicited.
   (2) The date, time and location where subbids are to be submitted.
   (3) The name of the individual within the company who will be available to answer questions about the project.
   (4) Where bid documents may be reviewed.
   (5) Any special requirements that may exist, such as insurance, licenses, bonds and financial arrangements.

   If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.
d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by State Construction Office and HUB Office, upon request.
g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), "MBE Documentation for Contract Payment" – (Appendix E), for designer's review.
j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.

k. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
l. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. Minority Business Responsibilities
While minority businesses are not required to become certified in order to participate in the State construction projects, it is recommended that they become certified and should take advantage of the appropriate technical assistance that is made available. In addition, minority businesses who are contacted by owners or bidders must respond promptly whether or not they wish to submit a bid.

SECTION 4: DISPUTE PROCEDURES
It is the policy of this state that disputes that involves a person's rights, duties or privileges, should be settled through informal procedures. To that end, minority business disputes arising under these guidelines should be resolved as governed under G.S. 143-128(g).

SECTION 5: These guidelines shall apply upon promulgation on state construction projects. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: www.nc-sco.com

SECTION 6: In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing minority business participation in the state construction program.

MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in State Construction Contracts** are hereby made a part of these contract documents. These guidelines shall apply to all contractors regardless of ownership. Copies of these guidelines may be obtained from the Department of Administration, State Construction Office, (physical address) 301 North Wilmington Street, Suite 450, NC Education Building, Raleigh, North Carolina, 27601-2827, (mail address) 1307 Mail Service Center, Raleigh, North Carolina, 27699-1307, phone (919) 807-4100, Website: http://www.nc-sco.com

MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts **or** affidavit (Affidavit B) of self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal.

OR

Provide Affidavit D, that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, **with documentation of Good Faith Effort, if the percentage is not equal to the applicable goal.**

OR

Provide Affidavit B, which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type project.

The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.

MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits or intentions made by the Bidder shall become a part of the agreement between the Contractor and the State for performance of this contract. Failure to comply with any of these statements, affidavits or intentions, or with the minority business Guidelines shall constitute a breach of the contract. A finding by the State that any information submitted either prior to award of the contract or during the performance of the contract is inaccurate, false or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the State whether to terminate the contract for breach.

In determining whether a contractor has made Good Faith Efforts, the State will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and results of these efforts. Good Faith Efforts include:

(1) Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government maintained lists at least 10 days before the bid or proposal date and notifying them of the nature and scope of the work to be performed.

(2) Making the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bid or proposals are due.

(3) Breaking down or combining elements of work into economically feasible units to facilitate minority participation.

(4) Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.

(5) Attending any prebid meetings scheduled by the public owner.

(6) Providing assistance in getting required bonding or insurance or providing alternatives to bonding or insurance for subcontractors.

(7) Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.

(8) Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.

(9) Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.

(10) Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

APPENDIX E

MBE DOCUMENTATION FOR CONTRACT PAYMENTS

Prime Contractor/Architect: _____

Address & Phone: _____

Project Name: _____

Pay Application #: _____ Period: _____

The following is a list of payments made to Minority Business Enterprises on this project for the above-mentioned period.

MBE FIRM NAME	* INDICATE TYPE OF MBE	AMOUNT PAID THIS MONTH	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A), American Indian (I), Female (F), Social and Economically Disadvantage (D)

Date: _____ Approved/Certified By: _____

Name

_____

Title

_____

Signature

SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT

(Revised on 3/14/2003)

SECTION 00 0880
SUBSURFACE INFORMATION

PART 1 — GENERAL

1.1 EXISTING SOILS REPORT

A. A copy of the soil boring report prepared for the site by the owner is attached immediately following this page.

1.2 INTERPRETATION/DISCLAIMER

A. Soil Investigation Data: Provided only for information and the convenience of the Contractor. The Owner and Architect/Project Civil Engineer DISCLAIM ANY RESPONSIBILITY for the accuracy, true location and extent of the soils investigation that has been prepared. They further DISCLAIM RESPONSIBILITY for interpretation of that data by bidders, as in projecting soil-bearing values, soil stability and the presence, level and extent of underground water.

B. Soil investigation data is NOT part of the contract documents.

PART 2- PRODUCTS

Not applicable to this section

PART 3- EXECUTION

Not applicable to this section

END OF SECTION 00 0880

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

JAMES H. TROGDON, III
SECRETARY

May 1, 2017

MEMORANDUM TO:	Karen E. Collette, PE Division 3 Engineer
ATTENTION:	Michael Mountcastle Facility Structural Engineer
FROM:	Chris Kreider, P.E. Eastern Regional Geotechnical Manager
STATE PROJECT:	45511.7
COUNTY:	New Hanover
DESCRIPTION:	Castle Hayne Multi-Unit Office
SUBJECT:	Revised Engineering Evaluation

DocuSigned by:
Christopher A Kreider
0263EDEBEADC45D...

The Geotechnical Engineering Unit (GEU) has revised engineering evaluations for the proposed storage structure to change the seismic site classification and include additional geotechnical items specified in 1803.5.11 of the North Carolina Building Code. This revised report supersedes the report dated November 16, 2016.

Project Information and Field Services

Proposed building site was located in conjunction with Division III and GEU personnel. Six (6) DCP tests were performed at the site. DCP tests were performed in accordance with ASTM STP 399 and were performed at 1-ft intervals starting at the existing ground surface. The DCP tests were used to evaluate the soil strength. Hand augers were utilized to extend the borings below the existing ground surface to visually evaluate soil type.

Mailing Address:
NCDOT EASTERN REGIONAL
GEOTECHNICAL OFFICE
1570 MAIL SERVICE CENTER
RALEIGH, NC 27699-1570

Telephone: (919) 662-4710
FAX: (919) 662-3095

Website: www.ncdot.gov

Location:
EASTERN REGIONAL
GEOTECHNICAL OFFICE
3301 JONES SAUSAGE RD, SUITE 100
GARNER, NC 27529-9489

Subsurface Findings and DCP Results

The surficial sediments encountered on site are comprised of ±6 or more feet of very loose to very dense SAND.

Test Location	Depth Below Grade (ft)	Average DCP Blow Count*	Material
DCP B1	0.0	4	Loose brown sand
	1.0	23	Medium dense brown sand
	2.0	31	Dense brown sand
	3.0	46	Dense brown sand
	4.0	30	Dense brown sand
	5.0	14	Medium dense brown sand
	6.0	12	Medium dense brown sand
	7.0	11	Medium dense brown sand
	8.0	36	Dense brown and gray sand
	9.0	20	Medium dense brown and gray sand
	10.0	14	Medium dense brown and gray sand
DCP B2	0.0	3	Very loose gray brown sand
	1.0	17	Medium dense gray sand
	2.0	11	Medium dense gray sand
	3.0	9	Loose dark gray sand
	4.0	8	Loose dark gray sand
	5.0	21	Medium dense tan and gray sand
	6.0	17	Medium dense brown sand
	7.0	26	Medium dense brown sand
	8.0	50	Dense brown sand
	9.0	10	Loose brown sand
	10.0	7	Loose brown sand
DCP B3	0.0	3	Loose gray sand
	1.0	50**	Very dense gray sand
	2.0	49	Dense gray sand
	3.0	10	Loose gray sand
	4.0	9	Loose gray sand
	5.0	50**	Very dense gray sand
	6.0	40	Dense gray sand
	7.0	17	Medium dense gray and brown sand
	8.0	12	Medium dense gray and brown sand
	9.0	9	Loose gray and brown sand
	10.0	3	Very loose gray and brown sand

DCP B4	0.0	3	Very loose brown and gray sand
	1.0	18	Medium dense brown and gray sand
	2.0	38	Dense brown and gray sand
	3.0	28	Medium dense brown and gray sand
	4.0	10	Loose brown and gray sand
	5.0	26	Medium dense brown and gray sand
	6.0	15	Medium dense brown and gray sand
	7.0	15	Medium dense brown and gray sand
	8.0	19	Medium dense brown and gray sand
	9.0	18	Medium dense brown and gray sand
	10.0	4	Loose brown and gray sand
DCP B5	0.0	2	Very loose tan and gray sand
	1.0	13	Medium dense tan and gray sand
	2.0	50**	Very dense gray and tan sand
	3.0	13	Medium dense gray sand
	4.0	50**	Very dense gray sand
	5.0	23	Medium dense gray sand
	6.0	23	Medium dense brown sand
	7.0	26	Medium dense brown sand
	8.0	15	Medium dense brown sand
	9.0	8	Loose brown sand
	10.0	6	Loose brown sand
DCP B6	0.0	1	Very loose brown and gray sand
	1.0	13	Medium dense brown and gray sand
	2.0	4	Loose brown and gray sand
	3.0	27	Medium dense brown and gray sand
	4.0	35	Dense brown and gray sand
	5.0	50**	Very dense brown and gray sand
	6.0	87**	Very dense brown and gray sand
	7.0	50**	Very dense brown and gray sand
	8.0	41	Dense brown and gray sand
	9.0	15	Medium dense brown and gray sand
	10.0	11	Medium dense tan and gray sand

NOTES:

*Average DCP Blow Count is the average of the last two 1.75-inch increment blow counts.

** DCP test at these intervals were terminated after the sum of the blows within two consecutive 1.75-inch intervals reached 100. The cone penetrometer was not advanced the full 5.25 inches at these depths.

Groundwater

Groundwater measurements were taken at three boring locations 24 hours after the boring was completed.
Each measurement was recorded as the distance from the ground surface to the water level in the hole.

Boring	24 hour groundwater measurement
DCP B1	9.4
DCP B2	9.1
DCP B3	9.0

Shallow Foundation Recommendations

The proposed multi-unit office building can be supported on shallow foundations on existing soils. An allowable bearing capacity of 2,000 psf is recommended for design of the building foundations founded on existing site soils. The footing size should be determined to resist sliding and overturning forces.

Recommend all slopes be constructed at a ratio of 3:1 (H:V) or flatter. Footing settlement is anticipated to be less than 1 inch. Differential settlement of footing is anticipated as less than 0.5 inch. A liquefaction assessment is not needed because the project site is located in Seismic Zone 1.

For frost protection and embedment, we recommend that the foundations bear at least 2.0 feet below finished grade. Following excavation, the bearing level should be evaluated by a qualified geotechnical engineer immediately prior to concrete placement.

A Seismic Site Classification D from Section 3.10.3.1 of AASHTO LRFD BRIDGE may be used for design purposes.

Existing site soils have the following earth pressure coefficients and unit weights.

	Active Earth Pressure	At Rest Earth Pressure	Passive Earth Pressure
Earth Pressure Coefficient	0.33	0.5	3.0
Total Unit Weight Above Water Table : 120 pcf Effective Soil Unit Weight Below Water Table : 60 pcf			

If you have any questions concerning this memorandum, please call Chris Kreider, P.E. or Jinyoung Park, P.E. at (919) 662-4710.

Prepared By:

NORTH CAROLINA PROFESSIONAL SEAL 032171 ENGINEER JINYOUNG PARK

DocuSigned by:
A713DB5C81BA498...
5/1/2017

Jinyoung Park, P.E.
Senior Geotechnical Design Engineer

CAK/JYP

Attachments: *Plan view of boring/DCP locations at Building Location*

BARBADOS BLVD.
SR 2662
PAVED ROADWAY
BACK OF CURB
18" C&G
BST
18" RCP
INV=24.14'
TOP=28.89
INV=23.64'
DCP B1
WOODS
BOLLARDS
CONC
TOP=29.66'
96" BLK &
BK WALL

SECTION 01 1000
SUMMARY OF THE WORK

PART 1 - GENERAL

The extent of work to be performed under the Contract for this project is itemized below. A summary of information included in this Section is as follows:

General project description.
Contract documents.
Contract Type

1.1 GENERAL PROJECT DESCRIPTION

A. The project is located at 5501 Barbados Blvd., Castle Hayne, North Carolina.

B. The Contractor shall, unless otherwise specified, supply all labor, transportation, materials, apparatus, fuel, water, energy, light, permits and tools and other items necessary for entire, proper and final completion of his work and shall install, maintain, and remove all equipment for construction, and shall be responsible for the safe, proper and lawful construction, maintenance and use of same and shall construct in the best and most workmanlike manner a complete structure and everything incidental thereto as shown on plans, stated in specifications or reasonably implied therefrom, all in accordance with the Contract Documents.

C. Description of the Work:

1. **Work by the Owner**: The owner shall provide site preparation work to include the following:
   a. Site clearing including removal of trees, stumps, vegetation, etc.
   b. Rough grading to 8" below finish grade.
   c. Excavations, fill, etc. as required for rough grading.
   d. Removal and replacement of unsuitable soils.
   e. Compaction of rough grade materials.
   f. Erosion control measures required by applicable regulations.
   g. All work shall be in compliance with the current State Stormwater Permit.
   h. Site preparation work by the owner will be completed prior to the Pre-Bid meeting.

2. **Work by the General Contractor**. The General Contractor shall include all work not indicated to be provided by the owner including, but not limited to the following:
   a. Grading and earthwork required to bring site to finish grade.
   b. Finish grading and all site related work.
   c. Construction of office building including structural, mechanical, plumbing, and

electrical.

d. Construction of all driveways, parking, paving, curbs, sidewalks, and other site elements.
e. Excavations and backfill as required for new construction.
f. Installation of all utilities and utility connections. Coordinate electrical service installation with local power company.
g. Construction of all site drainage and stormwater requirements.
h. Construction of and maintenance during construction of all drainage and erosion control methods required for compliance with applicable regulations.
i. Installation of landscaping and finish vegetation, grasses, mulch, shrubbery, etc.
j. Continue compliance with the current State Stormwater Permit.

1.2 CONTRACT DOCUMENTS

A. General

The work can be summarized by reference to the requirements of the various contract documents, which in turn make the reference to the requirements of other applicable provisions which control or influence the work; and these references can be summarized but are not necessarily limited to the following:

The General and Supplementary Conditions, which are bound herewith.

The Drawings, which comprise the total drawings for this project, as listed in the "Index of Drawings" on the Drawing Cover Sheet.

The Specification Sections, which comprise the total specifications for this project, are listed in the Project Manual Table of contents, which is bound herein.

1.3 CONTRACT TYPE

A. The work will be accomplished under:

A Lump Sum Agreement between Owner and Contractor as executed, along with any Addendums and attachments.

END OF SECTION 01 1000

SECTION 01 2000

PRICE & PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets.
2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the Schedule of Values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Submit draft of AIA Document G703 Continuation Sheets.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include separate line items for all major materials and distinct activities.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item for "Labor" and "Materials" for each item of work.

1.3 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Initial Application for Payment, Application for Payment at time of final acceptance, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the General Conditions.

C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.

D. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.

   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

E. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

   1. List of subcontractors.
   2. Schedule of Values.
   3. Contractor's Construction Schedule (preliminary if not final).
   4. Schedule of unit prices.
   5. Submittals Schedule (preliminary if not final).
   6. List of Contractor's staff assignments.
   7. List of Contractor's principal consultants.
   8. Copies of building permits.
   9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
   10. Initial progress report.
   11. Report of preconstruction conference.
   12. Certificates of insurance and insurance policies.

F. Application for Payment at Final Acceptance: After final acceptance, submit an Application for Payment showing 100 percent completion for the Work.

   1. Include documentation supporting claim that the Work is complete and a statement showing an accounting of changes to the Contract Sum.

G. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

   1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work. (If applicable)
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2000

SECTION 01 2200
UNIT PRICES

PART 1 GENERAL:

A. Submit with the Bid, in the spaces provided on the Form of Proposal, Unit Prices for the items described below which shall determine the value of any extra work or changes. The unit price shall reflect adding the described work or deleting it from the base bid where applicable; and shall be considered complete including, as applicable, all material, equipment, labor, substrate preparation, installation costs, overhead and profit.

B. The contract documents define, describe, or reasonably imply the total extent of work to be performed under the Base Bid. Unit prices are bid for the purpose of increasing the scope of work to accommodate field conditions where such conditions may not be reasonably predicted.

C. If utilized, the unit price work described in this section shall be incorporated in the Contract Amount by Change Order and included in the Construction Sequence in the same manner as if it had been a part of the Base Bid. Unit Price work begun without written approval of the Architect will be at the expense of the Contractor. The unit price shall not include cost of demolishing new construction to accommodate the described unit price item.

D. Unit prices are net and no profit or overhead shall be added or deducted when applying unit prices.

PART 2 SCHEDULE OF UNIT PRICES:

A. Earthwork: Unsuitable soils

1. Excavation and disposal of unsatisfactory soil materials and replacements with compacted satisfactory soil materials from off-site sources, on a cubic yard in place cost basis. Base bid shall include all grading shown in the construction documents. This Unit price shall be utilized only if unforeseen conditions arise.

B. Earthwork: Additional soils:

1. Additional soils (Fill material) in place, installed, graded, and compacted on a cubic yard basis. Fill material shall be as indicated in Section 31-2323. This unit price shall be utilized if additional soil is requested by the owner.

END OF SECTION 01 2200

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Submittals for review, information, and project closeout.

D. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Project record documents.

1.03 PROJECT COORDINATION

A. Project Coordinator: General Contractor.

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for construction access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Engineer through the Project Coordinator:
   1. Requests for interpretation.
   2. Requests for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction Punch List and Final Correction Punch List for final acceptance.
   11. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Owner will schedule a Pre-construction meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect and Engineers.
   3. General Contractor, and
   4. Major Sub-contractors

C. Minimum agenda: Data will be distributed and discussed on at least the following items:
   1. Organizational arrangement of Contractor's forces and personnel, and those of subcontractors, materials suppliers, and Architect.
   2. Channels and procedures for communication.
   3. Construction schedule, including sequence of critical work.
   4. Contract Documents, including distribution of required copies of original Documents and revisions.
   5. Processing of Shop Drawings and revision.
   6. Processing of Bulletins, field decisions, and Change Orders.
   7. Rules and regulation governing performance of the Work; and
   8. Procedures for safety and first aid, security, quality control, housekeeping, and related matters.
   9. Staging areas and limits of construction areas.
   10. Parking.
   11. Hours of work and Park hours.
   12. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   13. Designation of personnel representing the parties to Contract, Architect and Engineer.
   14. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

3.02 PROGRESS MEETINGS

A. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect and Engineer.
   4. Contractor's Superintendent.
   5. Major Subcontractors.

C. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period. (Next 30 days)
   9. Maintenance of quality and work standards.
   10. Effect of proposed changes on progress schedule and coordination.
   11. Other business relating to Work.

D. Meetings shall occur at least monthly as designated by the Architect and Owner.

3.03 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.04 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

3.05 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for final acceptance.

B. Submit Final Correction Punch List for final acceptance.

C. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.06 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.07 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 20 days excluding delivery time to and from the Contractor.

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

I. Provide space for Contractor and Architect review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

END OF SECTION 01 3000

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing and inspection agencies and services.

B. Control of installation.

C. Defect Assessment.

1.02 TESTING AND INSPECTION AGENCIES AND SERVICES

PART 2 (NOT USED)

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 TESTING AND INSPECTION

A. Testing Agency Duties:

1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
2. Perform specified sampling and testing of products in accordance with specified standards.
3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests/inspections specified.

B. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

C. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.

E. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.

3.03 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

END OF SECTION 01 4000

01-4100 Statement of Special Inspections

Project: Castle Hayne Multi Use Building
SCO ID#: 15-12499-02A
Location: Castle Hayne, NC
Owner's Representative: Sterling Baker, Facilities Management Unit
Building Address: 5501Barbados Blvd, Castle Hayne, NC 28429

Architect of Record: Burnett-Chalk Architecture
Structural Engineer of Record: Michael Mountcastle

This Statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the 2012 North Carolina State Building Code. It includes a Schedule of Special Inspection Services applicable to this project as well as the name of the Special Inspector and the identity of other approved agencies intended to be retained for conducting these inspections.

The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the State Construction Office, Structural Engineer and Architect of Record. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the State Construction Office, Structural Engineer and Architect of Record. The Special Inspections program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the State Construction Office, Owner, Structural Engineer and Architect of Record.

Interim Report Frequency: Monthly

A Final Report of Special Inspections documenting completion of all required Special Inspections and correction of any discrepancies should be submitted prior to issuance of a Certificate of Use and Occupancy.

Job Site safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by (Structural Engineer of Record):

Michael D. Mountcastle, P.E.
(Type or print name)

Signature Date

Owner's Authorization Accepted for the SCO by:

Signature Date Signature Date

Schedule of Special Inspection Services

The following sheets comprise the required schedule of special inspections for this project. The construction divisions which require special inspections for this project are as follows.

- ☐ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Cast-in-Place Concrete
- ☐ Masonry
- ☐ Wood Construction
- ☐ Soils
- ☒ Wind Requirements
- ☐ Special Foundations (Piles or Piers)
- ☐ Wall Panels/Veneer
- ☐ Sprayed Fire Resistant Material
- ☐ Exterior Insulation & Finish System
- ☐ Smoke Control
- ☐ Seismic Requirements
- ☐ Fire Rated Penetrations

Inspection Agents	Qualifications	Address
1. Special Inspector	SI	
2. Structural Engineer of Record Michael D. Mountcastle	SER	1 South Wilmington Street 1525 Mail Service Center Raleigh, NC 27699-1525
3. Testing Laboratory	ITL	
4. Architect of Record Margaret K. Chalk, AIA	A	Burnett+Chalk Architecture 105 Banks Street Morehead City, NC 28557

Note: The inspection and testing agent shall be engaged by the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the State Construction Office, prior to commencing work.

Seismic Design Category: D

Basic Wind Speed: 130 mph

Wind Exposure Category: B

Schedule of Special Inspection Services

Wind Requirements (Section 1706)

Item	Qualifications	Scope
1. Bolting, nailing, and other fastening of the main wind force resisting system components.	SER SI	• Periodic inspection of nailing, bolting, and other means of attachment for main structural members. • Periodic inspection of roof truss tie-down. • Periodic inspection of roof and wall bracing.
2. Wall cladding.	Architect SER	• Periodic inspection of brick and siding attachment.
3. Roof cladding.	SER SI Architect	• Periodic inspection of roof panel attachment.

END OF SECTION

CONTRACTOR'S STATEMENT OF RESPONSIBILITY

PROJECT: NCDOT DIVISION 3 Office – Castle Hayne

LOCATION: 5501 Barbados Blvd., Castle Hayne, NC

SCO ID# 15-12499-02A

BUDGET CODE: _____ ITEM: _____ DATE: _____

OWNER: NCDOT

DESIGNER: Burnette • Chalk Architecture & Planning, P.A.

PRIME CONTRACTOR: _____

CONTRACTOR RESPONSIBLE: _____

SYSTEM/COMPONENT: Main wind force resisting components, wall and roof cladding

I (we) acknowledge the special requirements outlined in the quality assurance plan. I (we) also acknowledge that control will be exercised to obtain conformance with the construction documents as approved by the Office of State Construction.

The following procedures will be established and strictly followed to maintain control within our organization:

_____

_____

_____

_____

The following reporting will be submitted to the Special Inspector, Owner and Office of State Construction at the following frequency:

Reporting method: _____

Frequency: _____

The following individuals(s) will be responsible for monitoring the procedures as set forth above:

Name: _____

Title: _____

Qualifications: _____

Signed this _____ day of _____, 2017

_____ _____

Name Title

SECTION 01 5000

FIELD OFFICES

PART1 GENERAL

1.01 SECTION INCLUDES

A. Temporary field office for use of Contractor.

1.02 RELATED REQUIREMENTS

A. Section 01 1000- Summary of the work.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

A. Materials. Equipment. Furnishings: Serviceable. new or used. adequate for required purpose.

2.02 CONSTRUCTION

A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations. with steps and landings at entrance doors.

B. Construction: Structurally sound. secure. weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed- can make use of Owner's site utilities for connection.

C. Fire Extinguishers: Appropriate type fire extinguisher at each office.

2.03 Contractor OFFICE AND FACILITIES

A. Size: As required for Contractor's needs.

B. Toilet: Provide toilet in office or portable toilet facility on site.

PART 3 EXECUTION

3.01 PREPARATION

A. Fill and grade site for temporary structure to provide drainage away from building.

3.02 INSTALLATION

3.03 MAINTENANCE AND CLEANING

A. Maintain approach walk free of mud, water, and snow.

END OF SECTION 01 5000

SECTION 01 5500

VEHICULAR ACCESS AND PARKING

PART1 GENERAL

1.01 RELATED REQUIREMENTS

A. Section 31 2200- Grading: Specifications for earthwork and paving bases.

PART 2

PRODUCTS PART

3 EXECUTION

3.01 PARKING

A. Parking and staging areas on site will be coordinated at the pre-construction conference.

3.02 NEW PERMANENT PAVEMENTS

A. Prior to final acceptance the base for permanent roads and parking areas may be used for construction traffic.

B. Care is to be taken in use of Barbados Drive and Contractor is to safely manage construction traffic and deliveries.

3.03 MAINTENANCE

A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, waste material, mud, snow, and ice..

B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

3.04 REMOVAL, REPAIR

A. Repair existing facilities damaged by use, to original

condition. B. Repair damage caused by installation.

3.05 MUD FROM SITE VEHICLES

A. Provide means of removing mud from vehicle wheels before entering Barbados Drive.

END OF SECTION 01 5500

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Transportation, handling, storage and protection.

B. Product option requirements.

C. Substitution limitations and procedures.

D. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. DO NOT USE products having any of the following characteristics:

C. Where all other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions.
2. If wet-applied, have lower VOC content.
3. Have a published GreenScreen Chemical Hazard Analysis.

2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.03 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

B. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension that may subsequently become apparent.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 01 6000

SECTION 01 7000
PROJECT CLOSEOUT

PART 1 - GENERAL

1.1 CLOSEOUT SUBMITTALS

A. Record Drawings: Maintain a set of Contract Drawings as Record Drawings. Mark to show installation that varies from the Work originally shown. See Section 01 7200

B. Record Specifications: Maintain one copy of the Project Manual, including addenda, as Record Specifications. Mark to show variations in Work performed in comparison with the text of the Specifications and modifications.

C. Operation and Maintenance Data: Organize data into 3-ring binders with "Tabs" to separate sections, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following:

1. Operation and maintenance instructions (See below)
2. Emergency instructions.
3. Spare parts list.
4. Copies of warranties.
5. Wiring diagrams.
6. Shop Drawings and Product Data.
7. Provide 3 complete sets for the Owner

D. Warranties and Bonds:

1. For equipment or components parts of equipment put into service during construction with NCDOT's permission, submit documents with acceptance of work.
2. Make other submittals at the final Application for Payment.
3. For all the work, the date of warranty will be the date of the final inspection.

1.2 INSPECTIONS

A. General: Prior to requesting Architect's pre-final and final inspection for certification of project completion, the Contractor shall fully inspect the work with his own forces and subcontractors to verify that the work is ready for inspection. The Contractor shall prepare a punchlist of work to be completed prior to requesting the Architect's pre-final inspection. All temporary utilities and facilities shall have been discontinued and removed from site, and final clean up completed.

B. Inspection Procedures: Upon receipt of each Contractor's written request, the Architect will schedule and proceed with a pre-final inspection, or advise the Contractor(s) that prerequisites are not fulfilled. Following the pre-final inspection the Architect will prepare a pre-final "Punchlist" identifying work that must be preformed prior to scheduling a final inspection. Final inspection will be scheduled once the Pre-Final punchlist items have been completed. Following the final inspection, the Architect will either recommend acceptance of the work to the Owner, or advise the Contractor(s) of work, which must be performed prior to acceptance of the work. The results of the Final inspection will form the final "Punchlist" for final acceptance and will be attached to the Recommendation of Acceptance.

1.3 CLOSEOUT PROCEDURES

A. General: Prior to requesting final payment, all requirements set forth within the Construction Documents shall be met, including the following:

1. Complete all work and punch list items. Provide written certification that all punchlist items have been completed or note reasons for any exceptions.
2. Complete all cleaning.
3. Submit one copy of approved shop drawings and submittals to the owner.
4. Submit all required guarantees, warranties, and certification, original and two copies.
5. Submit all Operation and Maintenance Instruction Manuals, in triplicate.
6. Instruct Owner in operation of equipment.
7. Submit all extra stock and spare parts, where required, in quantities indicated.
8. Submit list of final finish and materials selections, i.e., paint colors, stain colors, trim and panel color, floor finishes, carpet, vinyl, etc. (Triplicate)
9. Submit Project Record Drawings (As-Builts).
10. Submit listing of subcontractors and major materials/components, including identification of distributors and addresses of same in triplicate.
11. Submit Builder's Risk Cancellation Notice, in triplicate.
12. Submit Certificate indicating the amounts of state and local sales taxes paid, in triplicate.
13. Submit Final Payment, Requisition, in quantities indicated.
14. Submit Contractor's Affidavit of Payment of Debts and Claims, in triplicate.
15. Submit Contractor's Affidavit of Release of Liens, in triplicate.
16. Submit Consent of Surety Company to Final Payment, in triplicate.
17. Advise Owner of pending insurance changeover requirements.
18. Changeover locks and transmit keys to Owner.
19. Complete startup testing of systems and instruction of operation and maintenance personnel.
20. Remove temporary facilities and controls.
21. Touch up, repair, and restore marred, exposed finishes.
22. Obtain final inspections from authorities having jurisdiction.
23. Obtain certificate of occupancy.

B. Upon receipt of a request for inspection, Owner and Architect will proceed with inspection or advise Contractor of unfilled requirements. Architect will prepare the final inspection form after inspection or advise Contractor of items that must be completed or corrected before form can be issued.

C. Arrange for each installer of equipment that requires operation and maintenance to provide instruction to Owner's personnel. Include a detailed review of the following:

1. Startup and shutdown.
2. Emergency operations and safety procedures.
3. Noise and vibration adjustments.
4. Maintenance manuals.
5. Spare parts, tools, and materials.
6. Lubricants and fuels.
7. Identification systems.
8. Control sequences.

9. Hazards.
10. Warranties and bonds.

D. Request inspection for final acceptance and final payment, once the following are complete:

1. Submit final payment request with releases of liens and supporting documentation. Include insurance certificates.
2. Submit a copy of the final acceptance inspection list stating that each item has been completed or otherwise resolved for acceptance.
3. Submit final meter readings for utilities, a record of stored fuel, and similar data as of the date of final acceptance.
4. Submit consent of surety to final payment.

E. Architect will reinspect the Work on receipt of notice that the Work has been completed.

1. On completion of reinspection, Architect will prepare a certificate of final acceptance. If the Work is incomplete, Architect will advise Contractor of the Work that is incomplete or obligations that have not yet been fulfilled.

1.4 FINAL CLEANING

A. Clean each surface or item as follows before requesting inspection for certification of final acceptance:

1. Remove labels that are not permanent.
2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
3. Clean exposed finishes to a dust-free condition, free of stains, films and foreign substances. Leave concrete floors broom clean.
4. Vacuum carpeted surfaces and clean all remaining flooring.
5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
6. Clean the site. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

PART 2 – PRODUCTS

2.1 RECORD DRAWINGS: See Sections 01 7200

2.2 OPERATION AND MAINTENANCE DATA

A. For Each Product or System: list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

2.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. Provide for Each Product, applied material, and finish.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

2.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment,
adjusting, balancing, and checking instructions.

D. Provide servicing and lubrication schedule, and list of lubricants required. E.

Include manufacturer's printed operation and maintenance instructions.

F. Include sequence of operation by controls manufacturer.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Additional Requirements: As specified in individual product specification sections.

2.5 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data.

G. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

H. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   a. Significant design criteria.
   b. List of equipment.
   c. Parts list for each component.
   d. Operating instructions.
   e. Maintenance instructions for equipment and systems.
   f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
   a. Shop drawings and product data.

2.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of final acceptance is determined. All warranties and bonds must be submitted at (or by) the final inspection.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

END OF SECTION 01 7000

SECTION 01 7100
CLEANING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Throughout the construction period, maintain the building and site in a standard of cleanliness as described in this Section.

B. Related work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Amendments to General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. In addition to standards described in this Section, comply with requirements for cleaning as described in pertinent other Sections of these Specifications.

1.2 QUALITY ASSURANCE

A. Conduct daily inspection to verify that requirements for cleanliness are being met.

B. In addition to the standards described in this Section, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPATIBILITY

A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General:
   1. Retain stored items in an orderly arrangement allowing maximum access, not impeding traffic or drainage, and providing required protection of materials.
   2. Do not allow accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
   3. At least once each week, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
   4. Provide adequate storage for all items awaiting removal from the job site, observing requirements for fire protection and protection of the ecology.
   5. The existing building shall be cleaned daily of all debris and waste material resulting from the construction operations.
   6. All Contractors shall be responsible for cleaning of their work, and residue and debris caused by their work.

END OF SECTION 01 7100

SECTION 01 7123
FIELD ENGINEERING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide such field engineering services as are required for proper completion of the Work including, but not necessarily limited to:
   1. Establishing and maintaining lines and levels;
   2. Structural design of shoring, forms, and similar items provided by the Contractor as part of his means and methods of construction.

B. Related work:
   1. Additional requirements for field engineering also may be described in other Sections of these Specifications.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01340.

B. Submit the following:
   1. Certification, signed by the Contractor's retained field engineer or surveyor, certifying that elevations and locations of improvements are in conformance with requirements of the Contract Documents.

1.3 PROCEDURES

A. In addition to procedures directed by the Contractor for proper performance of the Contractor's responsibilities:
   1. Locate and protect control points before starting work on the site.
   2. Preserve permanent reference points during progress of the Work.
   3. Do not change or relocate reference points or items of the Work without specific approval from the Architect.
   4. Promptly advise the Architect when a reference point is lost or destroyed, or requires relocation because of other changes in the Work.
      a. Upon direction of the Architect, require the field engineer to replace reference stakes or markers.
      b. Locate such replacements according to the original survey control.

END OF SECTION 01 7123

SECTION 01 7200
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 AS-BUILT DRAWINGS

A. Contractor shall maintain a set of Record Drawings at the project site. These shall be kept legible and current, and shall be available at all times for the inspection of the Architect. All differences or changes in the contract work, or work added, shall be recorded daily on these Record Drawings in a contrasting color.

B. The Architect shall approve the As-Built Drawings.

C. Receipt and approval of As-Built Drawings are pre-requisites for final payment.

1.2 MANUALS

A. Contractor shall submit to the Architect before final acceptance three copies of all installation, operating instructions, and maintenance instructions on the equipment and materials furnished under his contract. Each set of copies shall be bound in a 3-ring, loose-leaf binder for 8-1/2" x 11" paper with black vinyl covers. Label each binder, designating the name of the project, the names of the owner, the name of the Contractor, and the equipment or materials included in the manual.

B. Manuals shall, in addition to the operations and maintenance information described above, include the following:

1. Names, addresses, and phone numbers of major suppliers and subcontractors, including painting and coatings, toilet partitions, millwork and cabinets, doors, windows, hardware, siding, electrical, ventilation, and plumbing.
2. A listing of all colors, paints, and finishes.
3. Door hardware model nos. manufactures, supplier, and installers.

1.3 GUARANTEES AND WARRANTIES

A. Contractor shall submit to the Architect before final acceptance three copies of all warranties, guarantees, and surety bonds. All such documents shall show the name and location of the project and the name of the Owner

END OF SECTION 01 7200

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Disposing of non-hazardous demolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction operations. Construction waste includes packaging.

B. Disposal: Removal off-site of demolition and construction waste deposit in landfill or incinerator acceptable to authorities having jurisdiction.

1.3 SUBMITTALS

A. Waste Management Plan: Submit [3] copies of plan within [30] days of date established for the Notice to Proceed.

B. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.4 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan.

B. Waste Identification: Indicate anticipated types of construction waste generated by the Work.

PART 2 - EXECUTION

2.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Architect. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
   1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

2.2 DISPOSAL OF WASTE

A. General: Remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials on Owner's property.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 7419

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete foundations and anchor bolts.

D. Concrete reinforcement.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including equipment pads.

G. Concrete curing.

H. Vapor Retarder at concrete slab on grade.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

D. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

F. ACI 305R - Hot Weather Concreting; 2010.

G. ACI 306R - Cold Weather Concreting; 2010.

H. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

J. ACI 347R - Guide to Formwork for Concrete; 2014.

K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.

L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.

M. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.

N. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2015a.

O. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.

P. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2013.

Q. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.

R. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.

S. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2014.

T. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

U. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.

V. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2013.

W. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.

X. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014.

Y. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).

Z. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.

AA. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

AB. COE CRD-C 513 - COE Specifications for Rubber Waterstops; 1974.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design for each class of concrete for review prior to concrete operations.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   2. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Fly Ash: ASTM C618, Class C or F.

D. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

D. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: 14-mil. Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
   1. Installation: Comply with ASTM E1643.
   2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations in vapor retarder.

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Grout: Comply with ASTM C1107/C1107M.
   2. Minimum Compressive Strength at 28 Days: 7,000 psi.

2.06 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

B. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard or felt, complying with ASTM D 1751, 1/4 inch thick and 4 inches deep; tongue and groove profile.

C. Sealant and Primer: As specified in Section 07 9005.

2.07 CURING MATERIALS

A. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.

2.08 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

D. Normal Weight Concrete:

1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on Structural drawings.
2. Fly Ash Content: Maximum 25 percent of cementitious materials by weight.
3. Water-Cement Ratio: Determined by mix design.
4. Total Air Content: Determined by mix design in accordance with ASTM C173/C173M.
5. Maximum Slump: 4 inches.

2.09 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's

recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Architect not less than 24 hours prior to commencement of placement operations.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
   1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
   2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
   3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
   4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.

B. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
   2. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.

C. Surfaces Not in Contact with Forms:
   1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
   2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   3. Final Curing: Begin after initial curing but before surface is dry.
      a. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Compressive Strength Tests: ASTM C39/C39M. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

3.10 DEFECTIVE CONCRETE

A. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

3.12 WASTE MANAGEMENT

A. Comply with Section 01 7419 - Construction Waste Management and Disposal Requirements, and Section 06 1000 - Rough Carpentry.

B. Separate, reuse and recycle waste materials to maximum extent economically feasible. Form lumber may be reused on the job for blocking, etc.

C. Before concrete pours, designate a location for cleaning out concrete trucks. Options include:

   1. On-site area to be paved later in Project.

D. Collect reinforcing steel and place in designated area for recycling.

END OF SECTION 03 3000

SECTION 04 0511
MASONRY MORTARING AND GROUTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

1.02 RELATED REQUIREMENTS

A. Section 04 2000 - Unit Masonry: Installation of mortar and grout.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries;

B. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete;

C. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar;.

D. ASTM C150/C150M - Standard Specification for Portland Cement;.

E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes;

F. ASTM C270 - Standard Specification for Mortar for Unit Masonry;.

G. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar;.

H. ASTM C404 - Standard Specification for Aggregates for Masonry Grout;.

I. ASTM C476 - Standard Specification for Grout for Masonry;.

J. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry;.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used.

C. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C 270 and test and evaluation reports per ASTM C 780.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.06 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

A. At Contractor's option, mortar and grout may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

B. Mortar Color: Natural gray unless otherwise indicated.

C. Mortar Mix Designs: ASTM C270, Property Specification.
   1. Exterior Masonry Veneer: Type S.
   2. Exterior, Loadbearing Masonry: Type S.

D. Grout Mix Designs:
   1. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type in accordance with ASTM C 94/C 94M.

2.02 MATERIALS

A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

B. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
   1. Color: Standard gray.

C. Portland Cement: ASTM C150.
   1. Type: Type I - Normal.
   2. Color: Standard gray.

D. Hydrated Lime: ASTM C207, Type S.

E. Mortar Aggregate: ASTM C144.

F. Grout Aggregate: ASTM C404.

G. Water: Clean and potable.

2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Do not use anti-freeze compounds to lower the freezing point of mortar.

D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

A. Mix grout in accordance with ASTM C94/C94M.

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified and at locations as indicated in drawings.

END OF SECTION 04 0511

SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clay Facing Brick.

B. Mortar and Grout.

C. Reinforcement and Anchorage.

D. Flashings.

E. Lintels.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 6510 - Flexible Copper Fabric Flashings

B. Section 07 9200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.

D. ASTM C55 - Standard Specification for Concrete Building Brick.

E. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.

F. ASTM C91/C91M - Standard Specification for Masonry Cement.

G. ASTM C150/C150M - Standard Specification for Portland Cement.

H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes

I. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale).

J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.

K. ASTM C476 - Standard Specification for Grout for Masonry.

L. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.

C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.

1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UP

A. Construct a masonry wall as a mock-up panel sized 4 feet long by 4 feet high; include mortar, accessories, and structural backup in mock-up.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 BRICK UNITS

A. Match existing::

1. Brick shall match existing adjacent building. Contractor shall confirm selection below with manufacturer.

B. Manufacturers:

1. Palmetto Brick Co.: http://www.palmettobrick.com/

   a. Field – Red wire cut

   b. Accent – Buffstone wire cut

2. Substitution: See section 01 6000 – Product Requirement.

C. Facing Brick: ASTM C216, Type FBS, Grade SW.

1. Color and texture: To be confirmed with manufacturer by contractor and approved by owner and Architect.
2. Nominal size: As indicated on drawings.
3. Special shapes: As required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.02 MORTAR AND GROUT MATERIALS

A. Mortar and Grout: As specified in Section 04 0511.

B. Masonry Cement: ASTM C91/C91M, Type S.

C. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

D. Hydrated Lime: ASTM C207, Type S.

E. Grout Aggregate: ASTM C404.

2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Blok-Lok Limited: www.blok-lok.com.
   2. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com.
   3. WIRE-BOND: www.wirebond.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.

C. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.

D. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in.

E. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 3-1/2 inches.

F. Adjustable veneer anchors shall be sized to accommodate 1" rigid insulation.

2.04 FLASHINGS

A. Copper Fabric Flashings: 5 oz./sq. ft. sheet copper bonded to fiber reinforced asphalt treated fabric. See Section 07 6510 Flexible Copper Fabric Flashing.

2.05 ACCESSORIES

A. Expansion Joint Filler: Closed cell expanded rubber.

B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.

C. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

D. Weeps:
   1. Provide weeps as indicated on plans.
   2. Type: Molded PVC grilles, insect resistant, full head joint. Submit sample for approval.

E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.06 LINTELS

A. See structural drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.04 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Brick Units:
   1. Bond: Running.

3.05 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

C. Remove excess mortar and mortar smears as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

3.06 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing, above shelf angles and lintels at bottom of walls, and where indicated on drawings.

3.07 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

B. Reinforce joint corners and intersections with strap anchors 16 inches on center.

3.09 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 6 inches into adjacent masonry or turn up at least 8 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend metal flashings through exterior face of masonry and turn down to form drip. Install joint sealer below drip edge to prevent moisture migration under flashing.

C. Extend plastic and laminated flashings to the exterior face of masonry.

D. Lap end joints of flashings at least 6 inches and seal watertight with flashing sealant/adhesive.

3.10 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control or expansion joints.

B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

C. Size control joints as indicated on drawings; if not shown, 1/2 inch wide and deep.

3.11 BUILT-IN WORK

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

D. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.13 CUTTING AND FITTING

A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.

B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 FIELD QUALITY CONTROL

A. NC DOT will perform field quality control observations.

3.15 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.16 WASTE MANAGEMENT

A. Separate and recycle waste materials to the maximum extent economically feasible.

B. Fold up metal banding, flatten, and place in designated area for recycling.

C. Collect wood packing shims and pallets and place in designated area.

D. Place unused mixed mortar in designated locations where lower strength mortar meets the requirements for bulk fill, for example, use as retaining wall footing ballast, cavity fill at grade, or underground utility pipe kickers.

E. Separate masonry waste and place in designated area for use as structural fill or landscape uses.

END OF SECTION 04 2000

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

G. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).

H. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

I. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

J. AWS D1.1/D1.1M - Structural Welding Code - Steel.

K. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.

L. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

N. SSPC-SP 2 - Hand Tool Cleaning

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel (AC172).

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283.

D. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, plain.

E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Lintels: As detailed; galvanized finish.

2.04 FINISHES - STEEL

A. Prime paint steel items.
   1. Exceptions: Galvanize items to be embedded in masonry.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION 05 5000

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Non-structural dimension lumber framing.

C. Rough opening framing for doors, windows, and roof openings.

D. Preservative treated wood materials.

E. Miscellaneous framing and sheathing.

F. Communications and electrical room mounting boards.

G. Concealed wood blocking, nailers, and supports.

1.02 RELATED REQUIREMENTS

A. Section 06 1753 - Shop-Fabricated Wood Trusses.

1.03 REFERENCE STANDARDS (Latest Edition)

A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. AWPA U1 - Use Category System: User Specification for Treated Wood.

E. PS 1 - Structural Plywood.

F. PS 2 - Performance Standard for Wood-Based Structural-Use Panels.

G. PS 20 - American Softwood Lumber Standard.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Spruce-Pine-Fir or Southern Yellow Pine, unless otherwise indicated.
2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: Kiln-dry or MC15.

C. Stud Framing (2 by 2 through 2 by 6):
   1. Grade: No. 2.

D. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):
   1. Grade: No. 2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 STRUCTURAL COMPOSITE LUMBER

A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.04 CONSTRUCTION PANELS

A. Roof Sheathing: Oriented strand board wood structural panel; PS 2.
   1. Grade: Sheathing.
   2. Bond Classification: Exposure 1.
   3. Performance Category: 5/8 PERF CAT.
   4. Span Rating: 40/20.

B. Wall Sheathing: Any PS 2 type.
   1. Bond Classification: Exterior.
   2. Grade: Sheathing.
   3. Span Rating: 24.
   4. Performance Category: 1/2 PERF CAT.
   5. Edge Profile: Square edge.

C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

D. Other Applications:
   1. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better. Mechanical platform sheathing shall be APA Rated Sheathing with 40/20 span rating, thickness as indicated on drawings.

2.05 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

2.06 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
2. All lumber exposed to the weather or in contact with concrete, masonry, or ground.

B. Preservative Treatment:
1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
   a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative to 0.4 lb/cu ft retention.
   a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
   b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual.

E. Construct double headers at ceiling openings: Use metal joist hangers unless otherwise detailed.

G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

C. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Chalkboards and marker boards.
   8. Wall paneling and trim.
   9. Joints of rigid wall coverings that occur between studs.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges use sheathing clips where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.

C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.

3.06 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 1000

SECTION 06 1753
SHOP-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated wood trusses for roof framing.

B. Bridging, bracing, and anchorage.

1.02 RELATED REQUIREMENTS (Latest Editions)

A. Section 06 1000 - Rough Carpentry: Material requirements for blocking, bridging, plates, and miscellaneous framing.

B. Section 06 2000 - Rough Carpentry: Installation requirements for miscellaneous framing.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction.

C. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing.

1. Include identification of engineering software used for design.
2. Provide shop drawings stamped or sealed by design engineer.
3. Submit design calculations.
4. Provide dimensioned detail at end condition (overhand) to receive fascia.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Perform design by or under direct supervision of a Professional Engineer experienced in design of this Work and licensed in North Carolina.

B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Handle and erect trusses in accordance with TPI BCSI 1.

B. Protect trusses from weather and condensation. Trusses showing discoloration, corrosion, or other evidence of deterioration must be inspected by the truss plate manufacturer or other acceptable inspection agency before concealment. Replace trusses which inspection determines to be damaged or defective.

C. Store trusses in vertical position resting on bearing ends.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Truss Plate Connectors:
   1. Alpine Engineered Products, Inc: www.alpeng.com.
   2. MiTek Industries, Inc; www.mii.com.
   3. Truswal Systems; www.truswal.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 TRUSSES

A. Wood Trusses: Designed and fabricated in accordance with TPI 1 and TPI DSB-89 to achieve structural requirements indicated.
   1. Connectors: Steel plate.

2.03 MATERIALS

A. Lumber:
   1. Moisture Content: Between 7 and 9 percent.

B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.

C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that supports and openings are ready to receive trusses.

3.02 ERECTION

A. Install trusses in accordance with manufacturer's instructions and TPI DSB-89 and TPI BCSI 1; maintain a copy of each TPI document on site until installation is complete.

B. Set members level and plumb, in correct position.

C. Do not field cut or alter structural members without approval of Architect.

D. Install permanent bridging and bracing.

E. Frame openings between trusses with lumber in accordance with Section 06 1000.

3.03 TOLERANCES

A. Framing Members: 1/2 inch maximum, from true position.

END OF SECTION 06 1753

SECTION 06 2000
CARPENTRY AND FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
   1. Install wood framing as indicated on the Drawings, specified here, and as needed for a complete and proper installation.
   2. Furnish and install wood, and FCB trim and other items not specifically described as being installed under other sections of these specifications.

B. Related work:
   1. Section 06 1000: Rough Carpentry
   2. Section 06 4023 Interior Architectural Woodwork

1.2 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 6000.

1.3 SUBMITTALS

A. Submit wood material certificates for all dimensional lumber showing specie, grade, moisture content and minimum allowable unit stresses allowed by American Lumber Standards Committee.

B. Submit preservative treatment and fire retardant treatment certificates of compliance with AWPA Standards.

C. Wood Treatment Data: Submit treatment manufacturer's instructions for proper use of each type of treated material.

   1. Pressure Treatment: For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.

1.4 QUALITY ASSURANCE

A. Lumber Standards: American Softwood Lumber Standard PS 20 and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review. Lumber to be S4S, Kiln Dried with 19% maximum moisture content at time of dressing. (KD-19).

B. Factory-mark each piece of lumber with type, grade, mill and grading agency identification.

C. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber Standards: DOC PS 20 and grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.

B. Softwood Plywood: DOC PS 1.

C. Hardwood Plywood: HPVA HP-1.

2.2 STANDING AND RUNNING TRIM

A. Exterior Trim: Smooth-textured Fiber Cement board.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

A. Installer must examine the substrates and supporting structure and the conditions under which the carpentry work is to be installed, and notify the Architect in writing of conditions detrimental to work. Do not proceed with the installation until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

B Coordination: Fit carpentry work to other work; scribe and cope as required for accurate fit. Correlate location of blocking, ground and similar supports to allow proper attachment of other work.

3.2 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 CARPENTRY INSTALLATION – GENERAL

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 to required levels and lines, with members plumb and true to line and cut and fitted.

C. Securely attach carpentry work to substrate by anchoring and fastening as shown and as required by recognized standards.

D. Use common wire nails, except as otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as required.

3.4 WORKMANSHIP

A. Produce joints, which are tight, true, and well nailed, with members, assembled in accordance with the Drawings and the Building Code of North Carolina.

B. Selection of lumber pieces:
   1. Carefully select the members.
   2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.
   3. Cut out and discard defects which render a piece unable to serve its intended function.
   4. Lumber may be rejected by the Architect, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
   5. Do not shim any framing component.

C. Sharp corners of exposed members shall be eased to promote finishing and protect users from slivers.

D. Jointing:
   1. Make joints to conceal shrinkage, miter exterior joints, cope interior joints, miter or scarf end-to-end joints.
   2. Install trim in pieces as long as possible with a minimum number of joints, jointing only where solid support is obtained.
   3. Cope at returns and miter at corners at interior trim.

E. Fastening:
   1. Install items straight, true, level, plumb and firmly anchored in place.
   2. Where blocking or backing is required, coordinate as necessary with other trades to ensure placement of required backing and blocking in a timely manner.
   3. Nail trim with finish nails of proper dimension to hold the member firmly in place without splitting the wood.
   4. On exposed work, set nails for putty.

5. Do not drive wood screws, except that they may be started by driving and then screwed home.

3.5 WOOD GROUND, NAILERS, BLOCKING, SLEEPERS, AND BRIDGING

A. Provide wherever shown and where required for screeding or attachment of other work. Form to shapes as shown and cut as required for true line and level of work to be attached. Coordinate location with other work involved.

B. Wall Blocking: Install oversized continuous wood blocking in stud wall cavities to support wall hung cabinets, toilet accessories and all items mounted on gypsum drywall construction. See drawings for the location and extent of items requiring blocking.

C. Countersink bolts and nuts flush with surfaces, unless otherwise indicated.

D. Installation of Plywood: Comply with applicable recommendations contained in Form No. E304, "APA Design/Construction Guide – Residential and Commercial, "for types of plywood products and applications indicated.

3.6 FINISHING

A. Sandpaper finished wood surfaces thoroughly as required to produce a uniformly smooth surface, always sanding in the direction of the grain, except do not sand wood which is designed to be left rough.

B. Set all exposed nails, fill with putty, and sand smooth.

C. No coarse grained sandpaper mark, hammer mark, wood grain mark, or other imperfection will be accepted.

3.7 CLEANING UP

A. Keep the premises in a neat, safe, and orderly condition at all times during execution of this portion of the Work, free from accumulation of sawdust, cut-ends, and debris.

B. Sweeping:
   1. At the end of each working day, and more often if necessary, thoroughly sweep surfaces where refuse from this portion of the work has settled.
   2. Remove the refuse to the area of the job site set aside for its storage.
   3. Upon completion of this portion of the Work, thoroughly broom clean all surfaces.

END OF SECTION 06 2000

SECTION 06 4023
INTERIOR ARCHITECTURAL WOODWORK

PART1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated cabinet units.

B. Countertops.

C. Cabinet hardware.

D. Factory finishing.

1.02 RELATED REQUIREMENTS

A. Section 06100- Rough Carpentry: Support framing, grounds, and concealed blocking.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ANSI A135.4- American National Standard for Basic Hardboard;

B. ANSI A208.1 -American National Standard for Particleboard;

C. ANSI A208.2 -American National Standard for Medium Density Fiberboard for Interior Use.

D. AWI/AWMAC (QSI) -Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada.

E. BHMA A156.9- American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; (ANSI/BHMA A156.9).

F. NEMA LD. 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association;

G. PS 1 -Structural Plywood;

1.04 SUBMITTALS

A. See Section 01 3000- Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes. Drawings must be in sufficient detail to show interface of this section with adjacent trades.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.

E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Premium quality, unless other quality is indicated for specific items.

B. Perform cabinet construction in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Premium quality, unless other quality is indicated for specific items.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect finished surfaces, including floors, jambs, soffits, and trim work of openings used as passageways.

B. Maintain surface finishes clean, unmarred and suitably protected until accepted by owner.

C. Protect units from moisture damage.

D. Repairs and Replacement: In the event of damage, promptly make replacement and repairs to approval of the Architect, at no cost to the owner.

PART 2 PRODUCTS

2.01 WOOD COMPONENTS

A. Wood:

1. Provide stain grade solid maple for doors, stiles, and face frames.
2. Provide stain grade ¾" maple plywood for finished ends/sides.
3. Provide cabinet grade finished plywood for interior shelving and cabinet backs.

2.02 PANEL MATERIALS

A. Exposed Surfaces: PS 1; APA A-A Grade, plain-sliced maple face veneer, Interior rated adhesives.

B. Counter Top Base Material: Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as required.

2.03 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation: www.formica.com.
   2. Panolam Industries International, Inc\Nevamar: www.nevamar.com.
   3. Wilsonart International, Inc: www.wilsonart.com.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications and as follows:
   1. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, colors as scheduled, finish as scheduled.

2.04 COUNTERTOPS

A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and solid wood banded, except restroom counters which are banded with HPDL 1X4.

2.05 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Edge Banding: Maple Hardwood edge banding.

C. Grommets: Painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.06 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.

C. Hinges: European style concealed self-closing type. Hinges to be BLUMOTION #71B3580, soft close, 110° Top Clip, or better.

D. Drawer Slides to be BLUMOTION Tandem soft close, #563H5330B, or better.

E. Door and Drawer Pulls to be Brushed Nickel Finish.

2.07 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Apply laminate backing sheet to reverse side of plastic laminate

finished surfaces.

2. Cap exposed plastic laminate finish edges with material of same finish and pattern. All Counter tops to be edge-banded with hardwood.

E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.08 FINISHING

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1500, Nitrocellulose Lacquer, Transparent.

E. Submit Stain and Varnish finish samples for approval of Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid,

plumb, and level. B. Use fixture attachments in concealed locations for

wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floor using appropriate angles and anchorages.

3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 06 4023

SECTION 06 6000
CELLULAR PVC FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cellular PVC fabrications including the following:
1. Trim.
2. Mouldings.

1.2 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry.

B. Section 06 20 00 - Finish Carpentry.

1.3 REFERENCES

A. ASTM International (ASTM): ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

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. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of authorities having jurisdiction and applicable codes at the location of the project.

B. Manufacturer Qualifications: Minimum 5 years experience manufacturing similar products.

C. Installer Qualifications: Minimum 2 years experience installing similar products.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Comply with manufacturer's recommendations. Handle materials to avoid damage.

1.7 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 recommended limits.

1.8 WARRANTY

A. Provide manufacturer's standard limited warranty for products, stating that components will be free from defects in material that occur as a direct result of the manufacturing process, occur under normal use and service, occur during the warranty period and result in blistering, peeling, flaking, cracking, splitting, cupping, rotting or structural defects from termites or fungal decay.
   1. Azek Trim Warranty Period: 25 years.
   2. Azek Moulding Warranty Period: 25 years.

PART 2 PRODUCTS

2.1 BASIS OF DESGN: AZEK Building Products Inc.

2.2 MANUFACTURERS

A. Acceptable Manufacturer:

   1. Azek Building Products, Inc.

   2. Certainteed Corp.

   3. Versatex

   4. Fypon. LTD.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.3 TRIM

A. Fire Performance Characteristics: Provide products complying with the following:
   1. Flame Spread Index: Less than 25, ASTM E 84.

B. PVC Trim: Material shall have the following characteristics:
   1. Material: Solid Cellular PVC.
   2. Style: Traditional.
   3. Trim Size, 5/4 Thickness:
      a. 5/4 inches x 5-1/2 inches x 18 feet actual dimension.

2.4 ACCESSORIES

A. Fasteners: Stainless steel or hot-dip galvanized, with thin shank, blunt point, full round head as recommended by the manufacturer.

B. Adhesives: Azek Adhesive, a non-toxic, odorless, UV stable, water-based PVC cement.

C. Sealants: Urethane, polyurethane or acrylic based sealants without silicone.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions that may be detrimental to proper or timely completion.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install products in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.
   1. Use manufacturer's recommended fasteners, not more than 2 inches from ends.
   2. Glue joints to eliminate joint separation.
   3. Allow for expansion and contraction at ends of the runs.

3.3 CLEANING AND PROTECTION

A. Protect from damage during construction operations. Promptly repair any damaged surfaces. Remove and replace work which cannot be satisfactorily repaired.

B. Clean products, prior to final acceptance, using materials recommended by the manufacturer to remove stains, dirt and debris prior to final acceptance.

END OF SECTION 06 6000

SECTION 07 2100

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following applications
   1. Cavity-wall insulation.
   2. Insulation in all exterior framed walls.
   3. Insulation in all interior frames walls..
   4. Insulation at roof structure.

1.2 REFERENCE STANDARDS (Latest Editions)

A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

B. ASTM C 665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulatio for Light Frame Construction and Manufactured Housing.

C. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E 136 – Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C.

E. NFPA 255 – Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

1.3 SUBMITTALS

A. See Section 01 3000 – Administrative Requirement, for submittal procedures.

B. Product Data; Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's installation Instructions: Include information on special Environmental conditions required for installation and installation techniques.

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

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Expanded Polystyrene Board Insulation: ASTM C 578; with the following characteristics:
   1. Flame Spread Index: 75 or less, when tested in accordance with ASTM # 84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E 84.
   3. Unfaced.
   4. 1" thick at wall cavity (R-4.5 min.)

B. Manufacturers:
   a. Dow Chemical Company.
   b. Owens Corning.
   c. Certainteed.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers:

   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Owens Corning.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:

   1. 3-1/2 inches (89 mm) thick: R-15
   2. 5-1/2 inches (140 mm) thick: R-19
   3. 10-1/4 inches thick: R-38 or greater.

2.3 VAPOR RETARDERS

A. Vapor Retarders: (See Section 03 3000 Concrete for Vapor Retarder below slab.)

2.4 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.5 INSULATION FASTENERS

A. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF CAVITY-WALL INSULATION

A. On units of foam-plastic board insulation, install pads of adhesive spaced approximately 24 inches (610 mm) o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates indicated.

3.3 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill

voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Install fiberglass insulation in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures.

D. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where needed. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

END OF SECTION 07 2100

SECTION 07 2500
WEATHER BARRIERS

PART1 GENERAL

1.01 SECTION INCLUDES

A. Water-Resistive Barrier: Under exterior wall cladding, over sheathing or other substrate; not air-tight or vapor retardant.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 -Cast-In-Place Concrete: Vapor retarder under concrete slabs on grade.

B. Section 06 1000 – Rough Carpentry: Water-resistive barrier behind exterior cladding.

C. Section 07 2100 - Thermal Insulation: Vapor retarder installed in conjunction with batt insulation.

1.03 DEFINITIONS

A. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture-resistant, to the degree specified, intended to be installed to shed water without sealed seams.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIER MATERIALS (NEITHER AIR BARRIER NOR VAPOR RETARDER)

A. Asphalt Felt: ASTM D 226 Type I felt (30 lb.).

B. Self-Adhesive flashing tape: Bituminous type with single side foil facing. Width as indicated.

2.02 ADHESIVES

A. Mastic Adhesive: Compatible with sheet seal and substrate, thick mastic of uniform knife grade consistency.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

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

B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer but at least 6 inches.
   3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
   4. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
   5. For applications specified to be air-tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
   6. Install water-resistive barrier over jamb flashings.
   7. Install air barrier and vapor retarder UNDER jamb flashings.
   8. Install head flashings under weather barrier.
   9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.

D. Openings and Penetrations in Exterior Weather Barriers:
   1. Install self-adhesive flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with self-adhesive flashing at least 4 inches wide; do not seal sill flange.
   3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using self-adhesive flashing at least 9 inches wide, covering entire depth of framing.
   4. At head of openings, install self-adhesive flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
   5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
   6. Service and Other Penetrations: Form self-adhesive flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

A. Do not cover installed weather barriers until required inspections have been completed.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 2500

SECTION 07 4113
PREFORMED METAL ROOF PANELS, GUTTERS & DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural roofing system of preformed steel panels.

B. Fastening system.

C. Factory finishing.

D. Accessories and miscellaneous components.

1.02 REFERENCE STANDARDS (All Standards refer to latest edition.)

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures;

B. ASTM A 463/A 463M -Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process;.

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process;.

D. ASTM A 792/A 792M -Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process;

E. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

F. ASTM B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric];

G. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing;

H. ASTM E 1592- Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference;

I. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference;

J. ASTM E 1680- Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems;

K. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies;

1.03 PERFORMANCE REQUIREMENT

A. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

B. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 90

C. FMG Listing: Provide metal roof panels and component materials that comply with

requiremetns in FMG 4471 as part of a panel roofing system and that re listed in FMG's "Approval Guide" for Class 1 or noncombustible construction's applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-120
2. Hail Resistance: SH

1.04 SUBMITTALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Storage and handling requirements and recommendations.
   2. Installation methods.
   3. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, soffits, gutters and downspouts, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
   1. Show work to be field-fabricated or field-assembled.

D. Selection Samples: For each roofing system specified including roof, soffits, and gutters, submit color chips representing manufacturer's full range of available colors and patterns with samples to match existing adjacent office building roof.

E. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer. General Contractor to provide five year builder's warranty on roofing system, in addition to the manufacturer's warranty on materials.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project. with not less than 5 years of documented experience.

B. Installer Qualifications: Company trained and authorized by roofing system manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking. cracking, blistering, or peeling within specified warranty period of 5 year period from date of final acceptance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers are:

B.
1. Petersen Aluminum: www.pac-clad.com
2. Butler: www.butlermfg.com.
3. Ceco: www.cecobuildings.com/roof.html
4. Varco-Pruden: www.vp.com.
5. Berridge Manufacturing Company: www.berridge.com

2.02 ARCHITECTURAL ROOF PANELS

A. Performance Requirements: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system. The metal roofing shop drawings are to be sealed by a registered engineer in the state of North Carolina.

B. Metal Roofing: Factory-formed panels with factory-applied finish.
1. Steel Panels:
   a. Aluminum-zinc alloy-coated steel conforming to ASTM A 792/A 792M; minimum A255 coating.
   b. Steel Thickness: Minimum 0.023 inch. (24 ga.)
2. Profile: Standing seam, with minimum 1.5 inch seam height; concealed fastener system.
3. Finish: Prefinished coatings (Kynar 500, Hylar 5000, or equal).
4. Length: Full length of roof slope, without lapped horizontal joints.
5. Width: Maximum panel coverage of 18 inches. (Match adjacent office building.)
6. Color: Match adjacent office building (Approved by Architect)

C. Underlayment requirement: Provide self-adhesive ice and watershield base sheet and underlayment as required and recommended by Roof Panel manufacturer, equal to grace ice and water shield-HT by GCP applied technologies. Install as per manufactures recommendations.

2.03 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements. including anticipated thermal movement and wind uplift loads..

2.04 PANEL FINISH

A. Fluoropolymer Coating System: Manufacturer"s standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss to match sample.

2.05 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish, closed-cell synthetic rubber, neoprene, or PVC, or combination steel and closed-cell foam.

1. Ridge Vent: Low profile with baffles to prevent wind driven rain intrusion. Materials and color to match roof panels. Submit shop drawings showing profile, attachments, dimensions, etc. and free area ventilation calculations indicating compliance with code requirements.

B. Sealants: As specified in Section 07 9200.

1. Exposed sealant must cure to rubber-like consistency.
2. Concealed sealant must be non-hardening type.

C. Gutters and Downspouts: Pre-finished aluminum, as shown on drawings. See 2.06.

D. Pre-finished aluminum wrap at fascia. .032 min.

E. Splash Pads: Not used (Downspouts piped to storm drain).

F. Downspout Boots: Plastic. (see drawings for location of underground roof water drainage)

G. Perforated *I* Solid aluminum soffit.

H. Snow Guards

I. Roof Penetration Flashing.

2.06 GUTTERS AND DOWNSPOUTS

A. DESIGN REQUIREMENTS

1. Conform to applicable code for size and method of rain water discharge.
2. PROJECT CONDITIONS
   a. Coordinate the work with downspout discharge pipe inlet.
3. MATERIALS
   a. Pre-Finished Aluminum Sheet: ASTM B 209 (ASTM B 209M); 0.032 inch thick.
      1) Finish: Plain, shop pre-coated with modified silicone coating.
      2) Color: As selected from manufacturer's standard colors. (To match roof and fascia).
4. COMPONENTS
   a. Gutters: square style profile. (Color to match roof panel) - 5" deep x 6" wide
   b. Downspouts: (Color to match roof panel) CDA Rectangular profile - 5" deep x 6" wide
   c. Anchors and Supports: Profiled to suit gutters and downspouts.
      1) Anchoring Devices: In accordance with CDA requirements.
      2) Gutter Supports: Brackets.
      3) Downspout Supports: Brackets.
   d. Fasteners: Galvanized steel or aluminum, with soft neoprene washers.
5. FABRICATION
   a. Form gutters and downspouts of profiles and size indicated.
   b. Fabricate with required connection pieces.

c. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
d. Hem exposed edges of metal.
e. Fabricate gutter and downspout accessories; seal watertight.
f. FACTORY FINISHING
   1) Modified silicone polyester coating: Baked enamel system conforming to AAMA 603.8.
   2) Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.
g. PART 3 EXECUTION
   1) INSTALLATION
      (a) Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
      (b) Connect downspouts to storm sewer system, where shown in drawings . Seal connection watertight.

2.07 ALUMINUM SOFFIT

A. Soffit panels shall be 12" wide by 3/8" deep and manufacturer shall be able to provide all three options of panel surface: Full Vent, Half Vent or Solid Soffit in the specified color(s). Vent pattern shall match adjacent office building. Submit samples and shop drawings for approval .

B. Materials: ASTM B-209 quality aluminum, 315-H14 Alloy and Temper material Aluminum shall be tension leveled (temper passed and stretcher leveled) with camber of a maximum of ¼" in 20 feet, manufactured in the USA, and shall be .032" thick aluminum, US standard grade.
   1. Color shall be Kynar 500 White to match adjacent office building.
   2. Panel Surface shall be: Full Vent Half Vent Solid.

C. Finishes: Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over 0.25 to 0.31 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil. Finish shall conform to tests for adhesion, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.

D. Field protection must be provided by the Contractor at the job site so material is not exposed to weather and moisture.

E. If any strippable film coating is applied to any pre-finished panels or materials for protection during shipping, strippable film shall be removed prior to installation.

F. Forming: use continuous and rolling method. No end laps on panels. "portable roll-forming" machines will be permitted on this project; no installer-owned or installer-rented machines shall be permitted. It is the intent of the Architect to provide Factory-Manufactured soffit systems only for this project.

G. Trim: Trim shall be fabricated of the same material and finish to match the profiled sheeting and press broken in lengths of 10-12 feet. Trim shall be formed only by the manufacturer or their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.

H. Fasteners: Fasteners shall be 400 series stainless steel, dished washers stainless steel with bonded neoprene.

H. Zees: Where required by design of primary structural framing system, zees shall be used to span between beams and/or other joists. Thermally responsive base and top clips shall be fastened to the zees on 12" centers.

J. Insulation: See Section 07 2100 Thermal Insulation.

2.08 SNOW GUARDS

A. Basis of Design: Snow Defender 6500 Standing Seam by Best Buy Metals.

B. Acceptable Manufacturers:
   1. Best Buy Metals
   2. Alpine
   3. Rocky Mountain

C. Material: Stainless Steel (304) powder coated to match metal roof color with EPDM insulating gasket.

D. Spacing: Provide one guard per standing seam, staggered, 18" and 36" from roof edge for all roof surfaces.

E. Fasteners shall be compatible with roof material.

F. Installation shall be in accordance with manufacturers recommendations.

G. Submit shop drawings including Cutsheets, installation instructions, and layout.

2.09 FABRICATION

A. Panels: Fabricate and finish panels and accessory items at factory, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

B. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

C. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.02 INSTALLATION

A. Overall: Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
   2. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, soffits, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.

C. Roof Panels: Install panels in strict accordance with Architects details and manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
   1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.

3.03 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, *waves,* scratch marks, or other damage to the finish.

3.04 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before date of final acceptance.

3.05 DAMAGED MATERIAL

A. Repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

END OF SECTION 07 4113

SECTION 074600

EXTERIOR TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Fiber-cement Fascia and trim.
2. Aluminum soffit.

1.2 SUBMITTALS

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

B. Samples: Full-size units of each type of soffit and trim in each color, texture, and pattern required.

C. Research/Evaluation Reports: For each type material.

PART 2 - PRODUCTS

2.1 EXTERIOR TRIM

A. Fiber-Cement Fascia and trim: Materials made from fiber-cement board that complies with ASTM C 1186, Type A, Grade II; is classified as noncombustible when tested according to ASTM E 136; and has a flame-spread index of 25 or less when tested according to ASTM E 84.

1. Products: Subject to compliance with requirements, provide products from one of the following:

   a. Cemplank, Inc.;
   b. CertainTeed Corp.;
   c. GAF Materials Corporation;
   d. James Hardie Inc.;

2. Horizontal Pattern: Boards (sizes as per drawings) in plain style and smooth texture.
3. Factory Priming: Manufacturer's standard acrylic primer.

2.2 SOFFIT

A. Aluminum Soffit: AAMA 1402, perforated, 12-inch (305-mm) exposure in V-grooved, double board style.

1. Finish: Manufacturer's standard primer and baked-on acrylic finish.
2. Color and Texture As selected from manufacturer's full range.

2.3 ACCESSORIES

A. Accessories: Provide starter strips, edge trim, corner cap, and other items as recommended by manufacturer for building configuration.

1. Provide accessories made from same material, unless otherwise indicated.
2. Provide accessories matching color and texture, unless otherwise indicated.

B. Fasteners: Use aluminum and hot-dip galvanized fasteners as appropriate.

1. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

B. Comply with siding manufacturer's written installation instructions unless more stringent requirements apply.

C. Install aluminum soffit and accessories according to AAMA 1402.

END OF SECTION 07 4600

SECTION 07 6510
FLEXIBLE COPPER SHEET FLASHINGS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Thru-wall flashing

B. Drip edge Flashing

1.2 REFERENCES

A. ASTM B370 – Copper Sheet and Strip for Building Construction.

1.3 SUBMITTALS

A. Provide in accordance with Section 01 3000 – Submittal Procedures.

B. Product Data: Submit manufacturer's product data and installation instructions.

C. Samples: (2 by 2) (51 by 51 mm) minimum sample of copper flashing(s).

D. Warranty: Lifetime

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Holdmann & Barnard, Inc.

B. Advanced Building Products, Inc.

C. MasonPro

D. Wire-Bond

2.2 PRODUCTS

A. Sheet Copper
   1. Type: 5 layers, flexible flashing consisting of copper sheet bonded on both sides to asphalt coated glass fabric; Advanced Copper Fabric as manufactured by Advanced Building Products, Inc. or equal.
   2, Characteristics: Waterproof, flexible, high tensile strength, resistant to mortar acid and alkali action, allowing minimum thermal cold flow through structure, and textured surface promoting mortar joint bonding.
   3. Copper sheet: Full, single copper sheet weighing 5 ounces per square foot and complying with ASTM B370.
   4. Coating: Asphalt bonded to copper and covered with coarsely woven, heavy glass fabric reinforcing.
   5. Roll width: As required
   6. Roll length: 25 feet minimum

B. Flashing mastic: Fibrated, trowel grade mastic consisting of asphalt, mineral stabilizers, and interfibe complying with ASTM D2822, Type 1; Cop-R-Tite Flashing Mastic as supplied by Advanced Building Products, Inc. or equal.

C. Pre-Formed Drip Edge Flashing
   1. Stainless Steel, 26ga.
   2. 3/8" closed hem
   3. Submit shop drawing showing installation of Drip Edge Flashing beneath three-wall flashing.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas to receive flashing.

B. Notify Architect of conditions that would adversely affect installation or subsequent use.

C. Do not surface preparation or installation until unacceptable conditions are corrected.

3.2 SURFACE PREPARATION

A. Prepare surfaces to receive flashing in accordance with manufacturer's instructions.

B. Ensure surfaces to receive flashing are free from loose materials and are reasonably smooth.

C. Ensure there are no slopes to form pockets or prevent free drainage of water to exterior surfaces of wall.

3.3 INSTALLATION

A. Install flashing in accordance with manufacturer's instructions at locations indicted on the drawings.

B. Masonry: Install masonry as specified in Section 04 2000.

C. Horizontal Masonry Surfaces:
   1. Lay flashing in slurry of fresh mortar and top with fresh full bet of mortar.
   2. Carry flashing through wall as indicated on the Drawings and leave exposed at exterior for inspection.
   3. After inspections, cut flashing flush with exterior masonry.

D. Vertical Masonry Surfaces:
   1. Apply sealant to surfaces receiving flashing to hold flashing in place until masonry is set.
   2. Secure flashing in back wall mortar joint or reglet as indicated on the drawings.

E. Foundation Sill Flashing:
   1. Lay flashing for foundation sills in slurry of fresh mortar and top with fresh full bed of mortar.

2. Leave flashing flush with exterior face of masonry and turn up on inside a minimum of 2 inches or carry upward across cavity a minimum of 6 inches.
3. Secure flashing in back wall in termination bar.
4. Bring flashing a minimum of ten inches up columns and secure, where sill and columns meet.

F. Cavity Wall Flashing:
1. Lay flashing in slurry fresh mortar and top with fresh full slurry and mortar.
2. Leave flashing flush with exterior face of masonry wall and carry through wall, upward across cavity a minimum of 6 inches (14 inches when using a 10 inch high mortar deflection device), and secure in back wall termination bar.

G. Head and Sill Flashing:
1. Start flashing flush with outside of wall or lintel angle and carry through or up wall as indicated on the drawings. Install pre-formed drip edge flashing as per manufacturer recommendations.
2. Extend flashing 6 inches beyond each side of opening and turn up at sides forming pan (or use pre-formed end dam option).
3. Fold corners; do not cut.

H. Other Areas: Install flashing at other locations in accordance with manufacturer's instructions.

I. Joining of Material:
1. Make joint by lapping a minimum of 4 inches and coating contact surfaces with sealant.
2. Install flashing with minimum number of lap joints.

J. Weep Holes:
1. Install flashing through masonry with proper drainage to outside.
2. Provide weep holes in head joint, directly on flashing as indicated on drawings.
3. Keep weep holes free of mortar droppings.

K. Mortar Deflection: Install mortar deflection device at flashing locations to ensure proper weepage.

3.4 FIELD QUALITY CONTROL

A. Inspection: Verify flashing has been properly installed at required locations to prevent water penetration.

B. Water Test:
1. Water test flashing at a minimum of 3 locations in each area where flashing has been installed.
2. Leave wall joint above flashing clean of mortar at each test location.
3. Force water into openings to determine if flashing has been properly installed and weep holes provided as specified.
4. Report water test results to Architect.

C. Trim flashing left exposed to exterior flush with masonry after inspection and water test.

3.5 PROTECTION

A. Protect installed flashing from damage during construction.

END OF SECTION 07 6510

SECTION 07 9200
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Throughout the work, seal and caulk joints where shown on the drawings and elsewhere as required to provide a positive barrier against passage of moisture and passage of air.
   1. Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
   2. Exterior joints in horizontal traffic surfaces.
   3. Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   4. Interior joints in horizontal traffic surfaces.

1.2 SUBMITTALS

A. Comply with pertinent provisions of Section 01 3000.

B. Submit the following:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.

1.3 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 6000.

B. Do not retain at the job site material which has exceeded the shelf life recommended by its manufacturer.

PART 2 - PRODUCTS

2.1 SEALANTS

A. Provide the following materials manufactured by Sonneborn Building Products or equals indicated below, where indicated or where otherwise required for a complete and proper installation.
   1. All surfaces: Sonneborn NP-1 with equals by, GE, Dow-Corning, Pecora, Tremco.
   2. Primers as required by the manufacturer.
   3. Polyethylene backer rod: Where required to prevent 3 point adhesion.

B. For other services, provide products especially formulated for the proposed use and approved in advance by the Architect.

C. Colors:
   1. Colors for each sealant installation will be selected by the Architect from standard colors normally available from the approved manufacturer.
   2. In concealed installations, use standard gray sealant.

2.2 PRIMERS

A. Use only those primers which have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the sealant used.

2.3 BACKUP MATERIALS

A. Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, which are non-absorbent, and which are non-staining.

2.4 MASKING TAPE

A. For masking around joints, provide an appropriate masking tape which will effectively prevent application of sealant on surfaces not scheduled to receive it, and which is removable without damage to substrate.

2.5 OTHER MATERIAL

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Architect.

2.6 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants.

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
   a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
2. Remove laitance and form-release agents from concrete.
   a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION

A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

G. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.3 PRIMING

A. Use only the primer approved by the Manufacturer for the particular installation, applied in strict accordance with the manufacturer's recommendations.

3.4 BOND-BREAKER INSTALLATION

A. Provide an approved bond-breaker where recommended by the manufacturer of the sealant, and where directed by the Architect, adhering strictly to the manufacturer's installation recommendations.

3.5. CLEANING UP

A. Remove masking tape immediately after joints have been tooled.

B. Clean adjacent surfaces free from sealant as the installation progresses, using solvent or cleaning agent recommended by the manufacturer of the sealant used.

C. Upon completion of the work of this Section, promptly remove from the job site all debris, empty containers, and surplus material derived from this portion of the Work.

END OF SECTION 07 9200

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Thermally insulated steel doors.

1.02 RELATED REQUIREMENTS

A. Section 08 8000 -Glazing: Glass for doors and borrowed lites.

B. Section 09 9100 -Paints and Coatings: Field painting.

C. Section 08 7100 – Finish Hardware

1.03 REFERENCE STANDARDS

A. ANSI A250.8- SDI-100 Recommended Specifications for Standard Steel Doors and Frames;

B. ANSI A250.10 -Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames;

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process;

D. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus;

E. BHMA A156.115- Hardware Preparation in Steel Doors and Steel Frames;

F. NAAMM HMMA 840- Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers;

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

1.05 QUALITY ASSURANCE

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

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Assa Abloy: www.assaabloydss.com.
   2. Windsor Republic Doors: www.republicdoor.com.
   3. Steelcraft: www.steelcraft.com.
   4. Substitutions: See Section 01600 - Product Requirements.
   5. Benchmark: www.benchmarkdoors.com (therma-Tru)

2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Door Edge Profile: Beveled on both edges.
   2. Door Texture: Smooth faces.
   3. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   4. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed), manufacturer's standard coating thickness.
   5. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 STEEL DOORS

A. Exterior Doors:
   1. Grade: ANSI A250.8 Level 3, physical performance Level A, Model 2, seamless.
   2. Core: Polystyrene foam.
   3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   4. Insulating Value: U-value of 0.13, when tested in accordance with ASTM C 1363.
   5. Weatherstripping: See Section 08710.

2.04 STEEL FRAMES

A. General:
   1. Comply with the requirements of grade specified for corresponding door.
      a. ANSI A250.8 Level 3 Doors: 14 gage frames.
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

B. Exterior Door Frames: Face welded, seamless with joints filled.
   1. Weatherstripping: See Section 08 7100.

2.05 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08 8000, factory installed.

B. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

C. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

3.02 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA840.

B. Coordinate frame anchor placement with wall

construction. C. Coordinate installation of hardware.

3.03 TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION 08 1113

SECTION 08 1416

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration; fire rated and non-rated.

1.02 RELATED REQUIREMENTS

A. Section 06 2000 - Finish Carpentry.

B. Section 08 1113 -Steel Door Frames.

C. Section 08 7100- Door Hardware.

D. Section 08 8000- Glazing.

E. Section 09 9100 -Paints and Coatings: Site finishing of doors.

1.03 REFERENCE STANDARDS

A. AWI/AWMAC (QSI)- Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada;

B. UL 1784 - Standard for Air Leakage Tests of Door Assemblies;

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Specimen warranty.

D. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

E. Samples: Submit two samples of door veneer, 12 by 12 inch in size illustrating wood grain, stain color, and sheen.

F. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality

standard. B. Accept doors on site in manufacturer's packaging. Inspect for

damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the

installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Graham Wood Doors: www.grahamdoors.com.
   2. Eggers Industries: www.eggersindustries.com.
   3. Haley Brothers: www.haleybros.com.
   4. Marshfield Door Systems, Inc.: www.marshfielddoors.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.02 DOORS AND PANELS

A. All Doors: See drawings for locations and additional requirements.
   1. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.

2.03 DOOR AND PANEL CORES

A. Solid Core 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated *above*.

2.04 DOOR FACINGS

A. Wood Veneer Facing for Transparent Finish: Species shall be red oak, veneer grade as specified by quality standard, plain sliced, book veneer match, running assembly match; unless otherwise indicated.

2.05 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

2.06 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard

specified. B. Cores Constructed with Stiles and Rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

D. Factory fit doors for frame opening dimensions identified on shop drawings, with

edge clearances in accordance with specified quality standard.
1. Exception: Doors to be field finished.

E. Provide edge clearances in accordance with AWI Quality Standards Illustrated Section 1700.

2.07 FACTORY FINISHING-WOOD VENEER DOORS

A. Doors shall be pre-finished in factory.
B. Owner will select stain color and finish from manufacturer's standard finishes. Provide samples for selection.
C. Factory finish doors in accordance with approved sample.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for maximum diagonal distortion.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION 08 1416

SECTION 08 3113
ACCESS PANELS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes access panels and frames for ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of access panel and frame indicated.

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

C. Samples: For each door face material in specified finish.

D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

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

1. ASTM A 123/A 123M, for galvanizing steel and iron products.
2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Steel Sheet: **electrolytic zinc-coated, ASTM A 591/A 591M with** cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 (ZF180) zinc-iron-alloy (galvannealed) coating or G60 (Z180) mill-phosphatized zinc coating.

D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Factory-Primed Finish: Manufacturer's standard shop primer.
2. Baked-Enamel Finish: Minimum dry film thickness of 2 mils (0.05 mm).
3. Powder-Coat Finish: Thickness not less than 1.5 mils (0.04 mm).

E. Drywall Beads: 0.0299-inch (0.76-mm) zinc-coated steel sheet to receive joint compound.

F. Manufacturer's standard finish.

2.2 ALUMINUM MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6, mill or anodized finish.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M).

1. Mill or anodized finish.

2.3 ACCESS PANLS AND FRAMES FOR CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis; A Cierra Products Co.
3. Bar-Co, Inc. Div.; Alfab, Inc.
4. Cendrex Inc.
5. Dur-Red Products.
6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
7. Jensen Industries.
8. J. L. Industries, Inc.
9. Karp Associates, Inc.
10. Larsen's Manufacturing Company.
11. MIFAB, Inc.
12. Milcor Inc.
13. Nystrom, Inc.
14. Williams Bros. Corporation of America (The).

B. Flush Access Panels and Frames with Exposed Trim:
1. Larsen Model L-LCP Light weight Access Panel or equal.
2. Cam Latch with interior release.

C. Panel Sizes:
1. 24" X 48" nominal. Coordinate with roof/ceiling structure.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view, provide materials with smooth, flat surfaces without blemishes.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 3113

SECTION 08 4113

ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

PART1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Aluminum doors and frames.

C. Weatherstripping.

D. Hardware

1.02 RELATED REQUIREMENTS

A. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.

B. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers;

B. ASTM B 209- Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate;

C. ASTM B 221 -Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

D. ASTM B 221M -Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric];

E. ASTM E 283- Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen;

F. ASTM E 330- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference;

G. ASTM E 331 -Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference;

1.04 PERFORMANCE REQUIREMENTS

A. Design and size components to withstand the following load requirements without damage or permanent set, when tested in accordance with ASTM E 330, using loads 1.5 times the design wind loads and 10 second duration of maximum load.

1. Design Wind Loads: Comply with requirements of ASCE 7-98 and the North Carolina State Building code.
2. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

B. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.

C. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft!min/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E 283.

D. Water Leakage: None, when measured in accordance with ASTM E 331 with a test pressure difference of 2.86 lbf/sq ft.

E. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

F. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. YKK AP America.

B. Other Acceptable Manufacturers:
   1. Kawneer North America: www.kawneer.com.
   2. United States Aluminum Corp: www.usalum.com.
   3. Tubelite: www.tubeliteinc.com.
   4. Substitutions: See Section 01 6000- Product Requirements.

2.02 COMPONENTS

A. Aluminum-Framed Storefront: Factory fabricated, factory finished, anodized thermally broken, aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Finish: High performance organic coating.
   2. Color: From Manufacturer's standard palette dark Bronze.

B. Aluminum Framing Members: Tubular aluminum sections, anodized thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing stops: Flush.

C. Doors: Glazed aluminum, anodized.
   1. Thickness: 1-3/4 inches.

2. Top Rail: 4 inches wide.
3. Vertical Stiles: 4-1/2 inches wide.
4. Bottom Rail: 6 inches wide.
5. Glazing Stops: Square.
6. Finish: Same as storefront.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B 221 (ASTM B 221M). B. Fasteners: Stainless steel.

C. Glass: Insulated / Tempered.

D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.04 HARDWARE

A. Door Hardware: Storefront manufacturer's standard type to suit application.
1. Include for each door weatherstripping, sill sweep strip, ADA threshold, pivot hinges, flush bolts, narrow stile handle latch, closer, and panic bars.
2. Provide ADA access pull handles at exterior side.
3. See Hardware Schedule Section 08 7100.

2.05 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

E. Arrange fasteners and attachments to conceal from view.

F. Reinforce components internally for door hardware.

G. Reinforce framing members for imposed loads.

H. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges. Finish color to be manufacturer's standard, Dark Bronze, matched to US10B/613.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Coordinate attachment and seal of perimeter air and vapor barrier materials.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of mastic and secure.

J. Install hardware using templates provided.

K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3ft non-cumulative or 1/16 inches per 10ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

END OF SECTION 08 4113

SECTION 08 5500

ALUMINUM-CLAD WOOD CASEMENT WINDOWS

PART1 GENERAL

1.01 SECTION INCLUDES

A. Factory fabricated unfinished interior wood windows, aluminum clad, with operating sash.

B. Operating hardware.

C. Insect screens.

D. Insulated glazing

1.02 RELATED REQUIREMENTS

A. Section 06 1000- Rough Carpentry: Rough opening framing.

B. Section 07 2500 -Weather Barriers: Perimeter air and vapor seal between window frame and adjacent construction.

C. Section 07 9200 -Joint Sealers: Perimeter sealant and back-up materials.

D. Section 08 8000 -Glazing.

E. Section 09 9100 -Paints and Coatings: Site finishing wood surfaces.

1.03 REFERENCE STANDARDS (Latest Editions)

A. AAMAIWDMNCSA 101/I.S.2/A440- Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors; American Architectural Manufacturers Association;

B. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen;

C. ASTM E 330- Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference;

D. ASTM E 331 -Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference;

E. WDMA I.S.4 -Water-Repellent Preservative Non-Pressure Treatment for Millwork; National Wood Window and Door Association;.

1.04 PERFORMANCE REQUIREMENTS

A. Performance Requirements: As specified in PART 2, with the following additional requirements:

B. Design and size windows to withstand dead loads and positive and negative wind loads acting normal to plane of wall calculated in accordance with NCBC 2012 code, when tested in accordance with ASTM E 330, using test loads equal to 1.5 times the design wind loads (130 mph) and 10 second duration of maximum load.

C. Deflection: Limit member deflection to flexure limit of glass with full recovery of glazing materials.

D. Design windows to accommodate, without damage to components or deterioration of seals, movement between window and perimeter framing and deflection of lintel.

E. Air Infiltration: Limit air leakage through assembly to 0.3 cu ftlmin/sq ft of wall area, measured at a reference differential pressure across assembly of 1.57 psf as measured in accordance with ASTM E283.

F. Water Leakage: None, when measured in accordance with ASTM E 331.

1.05 SUBMITTALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Product Data: Show component dimensions.

C. Shop Drawings: Indicate opening dimensions.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

1.09 WARRANTY

A. See Section 01 7800- Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pella Proline; Product Model No. 2347 factory-assembled aluminum-clad wood windows with outward-opening sash installed in frame. www.pella.com.

B. Other Acceptable Manufacturers:
   1. Anderson Windows Corp: www.andersenwindows.com.
   2. Marvin Windows: http://www.wdpc.com
   3. Weather Shield Manufacturing, Inc: www.weathershield.com.
   4. Substitutions: See Section 01 6000- Product Requirements.

WINDOW COMPONENTS

C. Windows: Aluminum clad wood frame and sash, factory fabricated and assembled.
   1. Performance Requirements: AAMAIWDMA/CSA 101/I.S.2/A440 R15.
   2. Exterior Surfaces: Metal clad, anodized, Bronze.
   3. Interior Surfaces: Unfinished wood.
   4. Configuration: As indicated on drawings.
   5. Factory glazed; dry glazing method.

D. Frames: 1'-11" inch wide x 3'-11" inch deep profile; flush solid wood glass stops of screw fastened type, sloped for wash.

E. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to effect weather seal.

2.02 MATERIALS

A. Wood: Clear pine, clear preservative treated using treatment type suitable for transparent or opaque finish.

B. Metal Cladding: Formed aluminum, factory finished, factory fit to profile of wood members.

2.03 HARDWARE

A. Sash lock: Lever handle with cam lock.

B. Operator: Lever action handle fitted to projecting sash arms with limit stops; baked enamel finish.

2.04 FABRICATION

A. Fabricate frame and sash members with mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.

B. Provide weather stop flange at entire perimeter of unit.

C. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet allowing installation and dynamic movement of perimeter seal.

D. Arrange fasteners to be concealed from view.

E. Provide internal drainage of glazing spaces to exterior through weep

holes. F. Double weatherstrip operable units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install operating hardware.

E. Install perimeter sealant and backing materials in accordance with Section 07 9200.

3.03 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.04 CLEANING

A. Remove protective material from factory finished surfaces.

B. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

END OF SECTION 08 5550

SECTION 08 7100
FINISH HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included:
   1. Furnish finish hardware as required to complete the work as shown on the Drawings and as specified herein.
   2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation.

B. Related work:
   1. Section 08 1113, Hollow Metal Doors and Frames
   2. Section 08 1416, Flush Wood Doors
   3. Section 08 4113, Aluminum Framed Entrances and Storefronts

1.2 QUALITY ASSURANCE

A. The contractor's hardware supplier shall, in the opinion of the Architect, have sufficient experience and an organization consisting of members of the American Society of Architectural Hardware Consultants (AHC) to properly handle, detail, and service the hardware in a satisfactory manner.

B. The contractor's hardware consultant shall visit the site upon completion of hardware installation, operation and adjustment. He shall check all hardware for proper installation and operation and submit a report of this inspection to the Architect.

1.3 References

A. A117.1 and ADA Title-III, Accessibility and Usability for Physically Handicapped Persons.

B. North Carolina State Building Code - with latest revisions.

1.4 SUBMITTALS

A. Comply with pertinent provisions of Section 01 3000.

B. Submit the following:
   1. Five paper copies of the completely detailed schedules for approval with a cut of each piece of hardware, or on pdf digital copy, 8 ½ X 11.
      a. Approval of this list by the Architect will not relieve the Contractor

of the responsibility to provide all finish hardware items required to complete the work.

C. Templates: In a timely manner to assure orderly progress of the work, deliver templates or physical samples of the approved finish hardware items to pertinent manufacturers of interfacing items such as doors and frames.

1.5 PRODUCT HANDLING

A. Deliver materials to jobsite packaged and marked with respective door numbers. Store hardware in a clean, secure and dry locations.

B. Fasteners:
   1. Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor the hardware in position for long life under hard use.
   2. Where necessary, furnish fasteners with toggle bolts, expansion shields, hex bolts, and other anchors approved by the Architect, according to the material to which the hardware is to be applied and according to the recommendations of the hardware manufacturer.
   3. Provide fasteners which harmonize with the hardware as to finish and material.
   4. Fasteners shall be stainless steel.

C. Where butts are required to swing 180 degrees, furnish butts of sufficient throw to clear the trim.

D. Furnish silencers for door frames at the rate of three for each single door and two for each door of a pair of doors; except weatherstripped doors.

1.6 OPERATION AND MAINTENANCE DATA

A. Provide manufacturers parts list and maintenance and instructions upon completion of the project.

B. The Contractor shall turn over to the owner any necessary wrenches and other tools that are packaged with the hardware for proper maintenance.

1.7 HANDICAP AND ADA COMPLIANCE

A. All hardware shall meet all requirements of the ICC A117.1-2009 and NC State Building Code 2012. Such requirements shall take precedence over any non-compliant hardware schedule, specification, or other requirements.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Butt Hinges: Furnish 5-knuckle stainless steel with NRP for exterior doors. Furnish 5-knuckle hinges for interior doors. NOTE: Furnish ball bearing hinges for all doors specified to have door closers.

B. Locksets: Schlage, Sargent, Russwin.

C. Push, Pulls, Kickplates: Baldwin, Cipco, Hager.

D. Door Closers: Norton, LCN, Russwin, Sargent.

E. Thresholds, Weatherstripping: Furnish Pemco, Zero, Reese

F. Stops: Ives, Baldwin, Johnson

2.2 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to the approval of the Architect.

2.3 KEYING

A. Factory key, masterkey, and grand-masterkey locks and cylinders shall be keyed to match the existing NCDOT keying system.

B. Supply keys in the following quantities:
   1. 4 master keys
   2. 2 grand master keys
   3. 3 change keys for each lock.

C. Construction keying:
   1. Furnish a construction masterkey system with 10 keys total for locks and cylinders.
   2. Use only the construction keys during construction.
   3. Upon final acceptance of the work, as that date is established by the Architect, void the construction key system and, in the presence of the Architect, demonstrate that the specified keying system is operating properly.

D. Identification and delivery:
   1. Factory stamp permanent keys, "DO NOT DUPLICATE".
   2. Identify Grand Master and Master keys with tags, and send direct to the owner by registered mail or receipted personal delivery.

2.4 TOOLS AND MANUALS

A. With the delivery of permanent keys, deliver to the owner one complete set of adjustment tools and one set of maintenance manuals for locksets, latchsets, closers, and panic devices.

B. Provide Owner (1) surface-mount steel key cabinet of sufficient capacity with baked enamel finish in color as selected by Architect. Mount where directed by Architect.

2.5 FINISHES

A. Finishes for this project shall be as indicated on the hardware schedule.

PART 3 - EXECUTION

3.1 DELIVERIES

A. Stockpile items sufficiently in advance to assure their availability, and make necessary deliveries in a timely manner to assure orderly progress of the total work.

3.2 COORDINATION

A. Coordinate as necessary with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Upon completion of the work, and as a condition of its acceptance, provide the inspection, adjustment, and report described in Article 1.2 above.

3.3 FINISH HARDWARE SCHEDULE

A. Finish Hardware Schedule is attached to this section.

B. Furnish the following hardware groups in the amounts indicated on the drawings.

C. All miscellaneous hardware required that is not specifically called out, shall be provided by the General Contractor. He shall submit all miscellaneous hardware for approval by the Architect.

PART 4 – FINISH HARDWARE SCHEDULE

A. Code Manufacturers Name and Basis of Design Products

HA	Hager
PE	Pemco
RO	Rockwood
SA	Sargent
HES	HES
NORT	Norton

HARDWARE SET #1

STOREFRONT ENTRY DOORS – Finish to be Manufacturer's Standard Dark Bronze. Match to US10B/613, Dark Satin Bronze.
HARDWARE BY STOREFRONT DOOR MANUFACTURER, Matched to hardware Set #2.
NOTE: Master Key Storefront locks to Sargent Exterior Door Locks (Hardware Set #2).

Item	Model	Finish	Manufacturer

See Section 08 4113 for additional Storefront Hardware information.

HARDWARE SET #2

HOLLOW METAL EXTERIOR DOORS

Item	Model	Finish	Manufacturer
1 Kick Plate	K1038--10"x 32"	US10B/613	RO
1 Lockset/Panic Device	8806--ET	US10BE/613E	SA
1 Electric Strike	9600-LBSM	613E	HES
3 Hinges	BB1199	US10B/613	HA
1 Closer	6000	690	NORT
1 Threshold	2009_PK	D-DK Bronze	PE

Note: Panic device to work with Electric Strikes on Exterior Doors.

HARDWARE SET #3

WORK ROOM BARN DOORS (Horizontal Rolling-Top Hung)

Item	Model	Finish	Manufacturer

Provide Brushed Stainless Steel finished box rail hardware with high density polymer wheels, and Round Brushed Stainless Steel pull bar handles on each side, as manufactured by Real Sliding Hardware or approved equal. Provide end caps, covers, and trim as required for a high finish installation.

HARDWARE SET #4

RESTROOM and BREAK ROOM DOORS

Item	Model	Finish	Manufacturer
1 Push Plate		26D	
1 Pull Plate		26D	
3 Hinges	BB1279	26D	HA
1 Closer	9500 HD ARM	626	NORT
1 Wall Stop	426	626	RO
1 Kick Plate	K1038-10"X32"	32D316	RO

HARDWARE SET #5

OFFICE DOORS

Item	Model	Finish	Manufacturer
1 Lockset	10G05	26D	SA
3 Hinges	BB1279	26D	HA
1 Wall Stop	426	626 (US32D)	RO

END OF SECTION 08 7100

SECTION 08 8000
GLAZING

PART1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

1.03

A. Section 08 1113 – Hollow Metal Doors and Frames: Glazed doors and borrowed lites.

B. Section 08 1416 - Flush Wood Doors: Glazed doors.

C. Section 08 4113- Aluminum Framed Entrances and Storefronts.

D. Section 08 550 - Aluminum Clad Wood Casements Windows: Glazed windows.

E. Section 10 2800- Toilet, Bath, and Laundry Accessories: Mirrors.

1.04 REFERENCE STANDARDS (Latest Editions)

A. 16 CFR 1201 -Safety Standard for Architectural Glazing Materials; current edition.

B. ASTM C 1036- Standard Specification for Flat Glass;.

C. ASTM C 1048- Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass;.

D. ASTM C 1172- Standard Specification for Laminated Architectural Flat Glass;.

E. ASTM E 1300- Standard Practice for Determining Load Resistance of Glass in Buildings;.

F. ASTM E 2190- Standard Specification for Insulating Glass Unit Performance and Evaluation;.

G. GANA (GM)- GANA Glazing Manual; Glass Association of North America;.

H. GANA (SM) - FGMA Sealant Manual; Glass Association of North America;.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

PART 2 PRODUCTS

2.01 GLAZING TYPES

A. Sealed Insulating Glass at window units: Vision glazing.
   1. Application(s): All exterior glazing unless otherwise indicated.
   2. Exterior glass thickness: Annealed float glass, 1/4 inch thick, minimum. a. Tinted:.
      b. Coating: Low-E type, on #2 surface.
   3. Interior glass thickness: Annealed float glass, 1/4 inch thick, minimum. a. Tinted:.
   4. Total Thickness: 1 inch.

B. Sealed Insulating Glass Units: Safety glazing, fully tempered.
   1. Applications: Provide this type of glazing in the following locations:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, State, and local codes and regulations. d. Other locations indicated on the drawings.

2.02 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with NCBC 2012 code. (130 MPH Winds)
   1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.

2.03 GLASS MATERIALS

A. Float Glass: All glazing is to be float glass unless otherwise indicated.
   1. Annealed Type: ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality 03 (glazing select).
   2. Heat-Strengthened and Fully Tempered Types: ASTM C 1048.
   3. Tinted Types: Color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

B. Laminated Glass: Float glass laminated in accordance with ASTM C 1172.
   1. Laminated Safety Glass: Comply with 16 CFR 1201 test requirements for Category II.
   2. Plastic Interlayer: 0.060 inch thick, minimum.
   3. Where fully tempered is specified or required, provide glass that has been tempered by the tong-less horizontal method.

2.04 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Types as indicated above.
   1. Durability: Certified by an independent testing agency to comply with ASTM E 2190.
   2. Edge Spacers: Aluminum, bent and soldered corners.
   3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   4. Purge interpane space with dry hermetic air.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of glass shall be in accordance with window manufacturer's standard methods and practice relative to climatic and environmental conditions for Wilmington, NC>

3.02 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION 08 8000

SECTION 09 2100
GYPSUM WALLBOARD SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Provide gypsum drywall and accessories for ceilings and walls where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

B. Related Work:
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Section in Division 1 of these Specifications.
   2. Section 06 1000: Rough Carpentry
   3. Section 08 1113: Hollow Metal Doors and Frames
   4. Section 08 7100: Finish Hardware
   5. Section 09 9100: Painting

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provisions of Section 01 3000.

B. Submit the following:
   1. Materials list of items proposed to be provided under this Section.
   2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
   3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting for rejecting actual installation procedures used on the work.

1.4 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 6000.

PART 2 - PRODUCTS

2.1 GYPSUM WALLBOARD

A. General:

1. Provide gypsum wallboard in 48" widths and in such lengths as will result in a minimum of joints.
2. Finish as indicated.

B. Manufacturers - Gypsum-Based Board:

1. American Gypsum: www.americangypsum.com.
2. CertainTeed Corporation: www.certainteed.com.
3. Georgia-Pacific Gypsum LLC: www.gp.com/gypsum.
4. National Gypsum Company: www.nationalgypsum.com.
5. USG Corporation: www.usg.com.
6. Substitutions: See Section 01600 - Product Requirements.

C. Gypsum Wallboard (G.W.B.): Paper-faced gypsum wallboard as defined in ASTM C 1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Mold Resistance: Score. of 10, when tested in accordance with ASTM D 3273.
   a. Mold and moisture resistant board is required in all toilets.
3. Thickness:
   a. Vertical Surfaces: 5/8 inch.
   b. Ceilings: 5/8 inch.
4. Mold-Resistant Paper-Faced Products:
   a. American Gypsum; M-Bloc.
   b. CertainTeed Corporation; ProRoc Brand Moisture & Mold Resistant Gypsum Board. c. National Gypsum Company; Gold Bond Brand XP Gypsum Board.
   d. Temple-Inland Inc; ComfortGuard.
   e. USG Corporation; Sheetrock Brand Mold Tough Gypsum Panels.

D. Backing Board For Wet Areas:

1. Application: Behind ceramic wall tile.
2. ANSI Cement-Based Board: Non-gypsum-based; aggregated portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C 1325.
   a. Thickness: 1/2 inch. b. Products:
      1) Custom Building Products; Wonderboard.
      2) National Gypsum Company; PermaBase Brand Cement Board.
      3) National Gypsum Company; PermaBase Flex Brand Cement Board.
      4) USG Corporation; Durock Brand Cement Board.
      5) Substitutions: See Section 01 6000 - Product Requirements.
3. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C 1288.
   a. Thickness: 1/2 inch.

2.2 METAL TRIM

A. Edge beads for use at perimeter of ceilings:
   1. Provide angle shapes with wings not less than 3/4" wide.
   2. Provide concealed wing perforated for nailing, and exposed wing edge folded flat.
   3. Exposed wing may be factory finished in white color.

2.3 JOINTING SYSTEM

A. Provide a jointing system, including reinforcing tape and compound, designed as a system to be used together, and as recommended for this use by the manufacturer of the gypsum wallboard approved for use on this work.

B. Jointing compound may be used for finishing if so recommended by its manufacturer.

C. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
   2. Vinyl-based drying type joint compound.

D. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

2.4 FASTENING DEVICES

A. For fastening gypsum wallboard in place on wood, use 1-1/4" type W bugle-head screws.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General:
   1. Install the gypsum wallboard in accordance with ASTM C 754, ASTM C 840, the manufacture's recommendations and the drawings.
   2. Separate boards in moderate contact but not forced into place,

3. At internal and external corners, conceal the cut edges of the boards by overlapping covered edges of the abutting boards.
4. Stagger the boards so that corners of any four boards will not meet at a common point except in vertical corners.
5. Ends of gypsum wallboard panels shall be secured to wood blocking as set forth in 06100, 3.3A.

B. Ceilings and Walls:
1. Install the gypsum wallboard to ceilings with the long dimension of the wallboard at right angles to the supporting members.
2 Walls: Install the gypsum wall board with the long dimension of the wallboard at right angles to the supporting members with vertical edges staggered.

C. Attaching:
1. Drive the specified screws with clutch-controlled power screwdrivers, spacing the screws 12" on centers at ceilings and 16" on centers at walls.
2. Attach double layers in accordance with the pertinent codes and the manufacturer's recommendations as approved by the Architect.
3. Attach to wood as required by governmental agencies having jurisdiction.
4. If attached to metal studs, secure gypsum board panel to "hard edge" of stud first, to maintain smooth joint condition.

3.3 JOINT TREATMENT

A. General:
1. Inspect areas to be joint treated, verifying that the gypsum wallboard fits snugly against supporting framework.
2. In areas where joint treatment and compound finishing will be performed, maintain a temperature of not less than 55 °F for 24 hours prior to commencing the treatment, and until joint and finishing compounds have dried.
3. Apply the joint treatment and finishing compound by machine or hand tool.
4. Sandpaper between coats as required.
5. When thoroughly dry, sandpaper to eliminate ridges and high points.

B. Finish gypsum board in accordance with levels defined in ASTM C 840, as follows:
1. Level 4: Walls and ceilings to receive flat or eggshell paint finish
2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
3. Level 2: Above finished ceilings concealed from view.

C. Embedding Component - As per manufacturer's recommendations.

D. Finishing Compounds:
   1. After embedding compound is thoroughly dry and has been completely sanded, apply a coat of finishing compound to joints and fastener head.
   2. Feather the finishing compound to not less than 12" wide.
   3. When thoroughly dry, sandpaper to obtain a uniformly smooth surface, taking care to not scuff the paper surface of the wallboard.

E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.4 OTHER METAL TRIM

A. General:
   1. The drawings do not purport to show all locations and requirements for metal trim.
   2. Carefully study the drawings and the installation, and provide all metal trim normally recommended by the manufacturer of the gypsum wallboard approved for use in this work.

3.5 CLEANING UP

A. In addition to other requirements for cleaning, use necessary care to prevent scattering gypsum wallboard scraps and dust, and to prevent tracking gypsum and joint finishing compound onto floor surfaces.

B. At completion of each segment of installation in a room or space, promptly pick up and remove from the working area all scrap, debris, and surplus material of this Section.

END OF SECTION 09 2100

SECTION 09 3000

TILE

PART1 GENERAL

1.01 SECTION INCLUDES

A. Tile for wall applications

B. Tile for thinset floor applications

C. Tile for mudset floor applications

D. Cementitious backer board as tile substrate.

E. Marble thresholds.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealers.

B. Section 09 2100 -Gypsum Board Assemblies: Installation of tile backer board.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ANSI A108 Series/A118 Series/A136.1 -American National Standard Specifications for the Installation of Ceramic Tile (Compendium);
   1. ANSI A108.1a- American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar;
   2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar;
   3. ANSI A108.4- American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive
   4. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar;
   5. ANSI A108.6- American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy;
   6. ANSI A108.8- American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout;
   7. ANSI A108.9- American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout;
   8. ANSI A108.10- American National Standard Specifications for Installation of Grout in Tilework;
   9. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units;
   10. ANSI A118.1 - American National Standard Specifications for Dry-Set Portland Cement Mortar;
   11. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar;
   12. ANSI A118.6 -American National Standard Specifications for Standard Cement Grouts for Tile Installation;
   13. ANSI A118.7- American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation;
   14. ANSI A118.9- American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units;
   15. ANSI A118.10- American National Standard Specifications for Load Bearing, Bonded,

Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation;

16. ANSI A137.1 -American National Standard Specifications for Ceramic Tile;

B. ASTM C 847- Standard Specification for Metal Lath;

C. TCA (HB)- Handbook for Ceramic Tile Installation; Tile Council of North America, Inc.;

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate tile layout, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

1.05 QUALITY ASSURANCE

A. Maintain one copy of TCA Handbook and ANSI A108 Series/A118 Series on site.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not install adhesives in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.
   1. American Olean: www.americanolean.com.
   2. Dai-Tile Corporation: www.daltile.com.
   3. Armstrong Flooring: www.armstrong.com
   4. Florida Tile: www.floridatile.com
   5. Substitutions: See Section 01 6000- Product Requirements.

B. Glazed Wall Tile: ANSI A137.1, and as follows:
   1. Size and Shape: 4 inch square, bullnose tile at top.
   2. Edges: Cushioned.
   3. Surface Finish: Semi-gloss.
   4. Colors: To be selected from manufacturer's standard range.

C. Paver Tile: ANSI A137.1, and as follows:
   1. Moisture Absorption: 0 to 0.5 percent.
   2. Size and Shape: 8 inch square.
   3. Face: Plain.
   4. Edges: Cushioned.
   5. Surface Finish: Non-slip.
   6. Colors: To be selected from manufacturer's standard range.
   7. Trim Units: Matching cove base.

2.02 TRIM AND ACCESSORIES

A. Thresholds: Marble, white or gray, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick; beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.

2.03 ADHESIVE MATERIALS

A. Manufacturers:
   1. Bonsai American, Inc: www.sakrete.com
   2. Bostik Inc: www.bostik-us.com.
   3. Mapei Corporation: www.mapei.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.04 MORTAR MATERIALS

A. Manufacturers:
   1. Bonsai American, Inc: www.sakrete.com
   2. Bostik Inc: www.bostik-us.com.
   3. Custom Building Products: www.custombuildingproducts.com.
   4. Substitutions: See Section 01 6000- Product Requirements.

B. Mortar Bed Materials: Portland cement, sand, latex additive and water.

C. Mortar Bond Coat Materials:
   1. Dry-Set Portland Cement type: ANSI A118.1.
   2. Latex-Portland Cement type: ANSI A118.4.

2.05 GROUT MATERIALS

A. Manufacturers:
   1. Bonsai American, Inc: www.sakrete.com
   2. Bostik Inc: www.bostik-us.com.
   3. Custom Building Products: www.custombuildingproducts.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Standard Latex/Portland Cement Grout: Any type specified in ANSI A118.6 or A118.7.

2.06 ACCESSORY MATERIALS

A. Waterproofing Membrane at Floors: PVC sheet membrane, 40 mils thick, minimum; specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.

B. Reinforcing Mesh: 2 x 2 inch size weave of 16/16 wire size; welded fabric, galvanized.

C. Metal Lath: ASTM C 847, Flat diamond mesh, of weight to suit application, galvanized finish.

D. Cementitious Backer Board: ANSI A118.9; High density, cementitious, glass fiber reinforced, 1/2 inch thick; 2 inch wide coated glass fiber tape for joints and corners.

E. Bridging material for floor control joints.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are.smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture

emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and comers, cover with skim coat of dry-set mortar to a feather edge.

3.03 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. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. 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.

E. Install thresholds where indicated.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

H. Allow tile to set for a minimum of 48 hours prior to grouting.

I. Grout tile joints. Use standard grout unless otherwise indicated.

J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION·FLOORS·THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION·FLOORS·MORTAR BED METHODS

A. Over interior concrete substrates, install in accordance with TCA Handbook Method F111, with cleavage membrane, unless otherwise indicated.

B. Cleavage Membrane: Lap edges and ends.

C. Mortar Bed Thickness: sloped with 5/8 inch minimum, unless otherwise indicated.

D. Provided slope to floor drains at 1/4" /ft.

3.06 INSTALLATION·WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244 Ceramic tile on wall behind toilets and sinks only, up to 60"AFF. Bullnose tile on top; Use the more standard 4" x 4" tiles.

3.07 CLEANING

A. Clean tile and grout surfaces.

3.08 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 3000

SECTION 09 5100
SUSPENDED ACOUSTICAL CEILING

PART1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 07 2100- Thermal Insulation

B. Section 08 310`0 - Access Doors and Panels: Access panels.

1.03 REFERENCE STANDARDS (Latest Editions)

A. ASTM C 635- Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings;

B. ASTM C 636/C 636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels;

C. ASTM E 580/E 580M - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint;

D. ASTM E 1264- Standard Classification for Acoustical Ceiling Products;

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning. Provide product data indicating manufacturers full line of products for pattern/texture selection by Architect.

C. Product Data: Provide data on suspension system components and acoustical tiles.

D. Samples: Submit two samples 4 x 4 inch in size illustrating material and finish of acoustical units.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

A. Manufacturers:
   1. CertainTeed Corporation; Product Baroque: www.certainteed.com.
   2. USG: www.usg.com.
   3. Armstrong World Industries, Inc.: www.armstrong.com.
   4. Acoustical Ceiling Designs, Inc.: www.acdesigninc.com
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Acoustical Units- General: ASTM E 1264, Class A.

C. Acoustical Panels: Painted mineral fiber, ASTM E 1264 Type III, with the following characteristics:
   1. Size: 24 x 24 inches.
   2. NRC Range: MIN. 0.55, determined as specified in ASTM E 1264.
   3. Edge: Tegular.
   4. Surface Color: White.

5. Suspension System: Exposed grid Type Single web tee 15/16 inch wide.
6. Texture/Pattern: As selected by Architect.

2.02 SUSPENSION SYSTEM(S)

A. Manufacturers:
   1. Same as for acoustical units.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Suspension Systems- General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; intermediate-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Single web.
   3. Finish: White painted.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION·SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

D. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

E. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

H. Do not eccentrically load system or induce rotation of runners.

I. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION- ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09 5100

SECTION 09 6513
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
1. Resilient base.
2. Resilient molding accessories.

1.2 SUBMITTALS
A. See Section 01 3000
B. Product Data: For each type of product indicated.
C. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.
D. Maintenance data for products specified in this Section, to include in Operating and Maintenance Manual specified in Division 1.

1.3 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.4 MATERIALS
A. Deliver to Owner not less than 10 linear feet for each 500 linear feet or fraction thereof, in roll form of each different material, style and color of resilient wall base installed.

1.5 PROJECT CONDITIONS
A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
B. Until final acceptance, maintain ambient temperatures within range recommended by manufacturer.
C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE
A. Resilient Base:
1. Manufacturers: Subject to compliance with requirements, as indicated on drawings:
a. Flexco, Inc.
b. Johnsonite
c. Roppe
d. Armstrong
e. Burke

B. Resilient Base Standard: ASTM F 1861.
   1. Material Requirement: Type TS (rubber, vulcanized thermoset).
   2. Manufacturing Method: Group I (solid, homogeneous).
   3. Style: Cove (base with toe).
C. Minimum Thickness: 0.125 inch (3.2 mm).
D. Height: 4 inches (102 mm).
E. Lengths: Coils in manufacturer's standard length.
F. Outside Corners: Preformed.
G. Inside Corners: Preformed.
H. Finish: Satin.
I. Colors and Patterns: As selected by the Architect from manufacturer's standard colors..

2.2 RESILIENT MOLDING ACCESSORY
A. Resilient Molding Accessory:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Flexco, Inc.
      b. Johnsonite
      c. Roppe
      d. Armstrong
      e. Burke
B. Description: Carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, Transition strips.
C. Material: Rubber.
D. Profile and Dimensions: As selected by architect.
E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Cove Base Adhesives: Not more than 50 g/L.

PART 3 - EXECUTION

3.1 PREPARATION
A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
B. Concrete Substrates for Resilient Accessories: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

3.3 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet, resilient floor covering that would otherwise be exposed.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Cover resilient products until final acceptance.

END OF SECTION 09 6513

SECTION 09 6813
CARPET TILE

PART1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

1.02 REFERENCE STANDARDS (Latest Editions)

A. ASTM F 710- Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring;

B. CRI 104- Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute;

C. CRI (GLA)- Green Label Testing Program- Approved Adhesive Products; Carpet and Rug Institute; current listings at www.carpet-rug.org.

1.03 SUBMITTALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate layout of joints.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

D. Samples: Submit carpet tiles illustrating color and pattern design for each carpet color selected for review.

1.04 QUALITY ASSURANCE

1.05 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Faculty 4138 Starlight by Lee's Carpet

B. Other Acceptable Manufacturers:
   1. Mannington: www.mannington.com.
   2. Shaw Carpets: www.shawfloors.com.
   3. Mohawk: www.mohawkfiooring.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Carpet Tile: Variable loop, manufactured in one color dye lot.
   1. Tile Size: 24x24 inch, nominal.
   2. VOC Content: Comply with specification and building code requirements.

2.03 ACCESSORIES PART 3 EXECUTION

A. Vinyl Edge Strips

1. Provide vinyl edge strips at transitions between carpet and other floor finishes.

2. Submit samples for approval.

3. Color as selected by Architect from manufacturer Standard colors.

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and fiat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that wall surfaces are smooth and fiat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are dry enough and ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by carpet tile manufacturer and adhesive materials manufacturer.

3.02 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions and CRI 104.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Complete installation of edge strips, concealing exposed edges.

3.03 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION 09 6813

SECTION 09 8000
CHEMICALLY RESISTANT EPOXY FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work included: Apply special epoxy coating to concrete slab as scheduled.
B. Related Work:
   1. Section 03 3000: Cast in Place Concrete

1.2 SUBMITTALS:

Submit the following according to Conditions of the Contract and Division 1 Specification Sections:

A. Product data for each coating system specified, including block fillers and primers.
   1. Provide the manufacturer's technical information including label analysis and instructions for handling, storing, and applying each material proposed for use.
   2. List each material and cross-reference the specific coating and finish system, and application. Identify each material by the manufacturer's catalog number and general classification.
   3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
B. Samples for initial color selection in the form of manufacturer's color charts. After color selection, the Architect will furnish color chips for surfaces to be coated.
C. Samples for Verification Purposes: Provide samples of each color and material to be applied with texture to simulate actual conditions on representative samples of the actual substrate. Provide stepped samples defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until the required sheen, color, and texture are achieved.
   1. Provide a list of materials and applications for each coat of each sample. Label each sample as to location and application.
   2. Submit samples on the following substrates for the Architect's review of color and texture only.
      a. Concrete: Provide two 6-inch-square samples for each color and finish.

1.3 Applicator Qualifications:

Engage an experienced applicator who has successfully completed coating system applications similar in material and extent to those indicated for the Project, with a minimum of 10 years' experience.

1.4 Single-Source Responsibility:

Provide primers and undercoat material produced by the same manufacturer as the finish coats.

1.5 Field Samples:

Duplicate finishes of prepared samples. Provide full-coat finish samples on at least 100 sq. ft. of surface.

1. Final acceptance of colors will be from job-applied samples.
2. The Architect will select one room, area, or surface to represent surfaces and conditions for each type of coating and substrate to be coated. Apply coatings in this room, area, or surface according to the schedule, or as specified.

1.6 Deliver materials to the job site in the manufacturer's original, unopened packages and containers bearing manufacturer's name and label.

1.7 Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials, and residue.

1.8 Project Conditions: Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are between 45 deg F (7 deg C) and 95 deg F (35 deg C). Do not apply coatings in snow, rain, fog, or mist; when the relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces. All environmental conditions must be in absolute strict compliance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 Material: Provide Armour Seal 1000 Epoxy Coating floor covering as manufactured by Sherwin Williams or equal by approved manufacturers.

2.2 Approved manufacturers: Subject to compliance with requirements, provide products of one of the following:
1. Sherwin Williams
2. Duron
3. Behr
4. Dur–A -Flex

2.3 Special Coating Materials, General: Provide fillers, primers, finish coat material, and related materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by the manufacturer based on testing and field experience.

2.4 Material Quality: Provide the highest quality grade of the various coatings as regularly manufactured by acceptable coating manufacturers. Materials not displaying manufacturer's identification as a best-grade product will not be acceptable.

2.5 Colors: Provide color selections from the manufacturer's full range of standard colors. Color to be selected by Architect.

2.6 Surface: Slip Resistant (Submit sample for approval).

PART 3 - EXECUTION

3.1 Examination: Examine substrates and conditions under which coatings will be applied for compliance with requirements on applying coatings. Surfaces to receive coatings must be thoroughly dry before coatings are applied.

A. Do not proceed with coating application until unsatisfactory conditions have been corrected.

B. Start of application will be construed as the Applicator's acceptance of surfaces within that particular area.

3.2 Coordinating Work: Review Sections in which other coatings are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on the characteristics of specified finish materials, to ensure use of compatible primers.

A. Notify the Architect of problems anticipated using the coatings specified over substrates primed by others.

3.3 Preparation: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already in place that are not to be coated, or provide surface-applied protection prior to surface preparation and coating. Remove these items, if necessary, to completely coat the items and adjacent surfaces. Following coating operations in each space or area, have items reinstalled by workers skilled in the trades involved.

3.4 Cleaning: Clean substrates of substances that could impair bond of the various coatings. Remove oil and grease prior to cleaning. Schedule cleaning and coating application so dust and other contaminates from the cleaning process will not fall on wet, newly coated surfaces.

3.5 Surface Preparation: Clean and prepare surfaces to be coated according to the manufacturer's instructions for each particular substrate condition and as specified.

A. Provide barrier coats over incompatible primers or remove and reprime.

B. Cementitious Surfaces: Prepare cementitious surfaces to receive special coatings. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen, as required, to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surface.

1. Use abrasive blast-cleaning methods, if recommended by the coating system manufacturer. Shot Blast on Mechanically A Grade (CSPA -6)

2. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. Do not apply coatings over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions.

3.6 Material Preparation: Carefully mix and prepare materials according to the coating manufacturer's directions.

A. Stir materials before application to produce a mixture of uniform density, as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain the coating material before using.

B. Use only thinners approved by the manufacturer, and only within recommended limits.

3.7 Application: Apply special coatings by brush, roller, spray, squeegee, or other applicators according to the manufacturer's directions. Use brushes best suited for the material being applied. Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

A. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to the formation of a durable coating film.
B. Coating colors, surface treatments, and finishes are indicated in the Schedules.
C. Provide finish coats compatible with the primers used.
D. The number of coats and the film thicknesses required are the same regardless of the application method. Do not apply succeeding coats until previous coat has cured. Sand between ap /plications where sanding is required to produce a smooth, even surface.
E. Where undercoats or other conditions show through the final coat, apply additional coats until the cured film has a uniform coating finish, color, and appearance.
F. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
G. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces.

3.8 Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable and before subsequent surface deterioration. Allow sufficient drying time between successive coats. Do not recoat until the coating has dried.

3.9 Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to the manufacturer's directions.

A. Brushes: Use brushes best suited for the material applied.
B. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
C. Spray Equipment: Use spray equipment with orifice size as recommended for the material and texture required.

3.10 Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.

3.11 Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material required to be coated or finished that has not been prime-coated by others. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

3.12 Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

3.13 Cleaning: At the end of each work day, remove rubbish, empty cans, rags, and other

discarded materials from the site.

A. Upon completion of work, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

3.14 Protection: Protect work of other trades, whether to be coated or not, against damage from coating. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to the Architect. Leave in an undamaged condition.

3.15 Signs: Provide "Wet Paint" signs to protect newly coated finishes. Remove temporary protective wrappings provided by others for protection of their work, after completing coating operations.

A. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.16 Finish surfaces shall be smooth, evenly coated, uniform in color and texture, without blemish or surface or finish irregularities..

END OF SECTION 09800

SECTION 09 9100
PAINTS AND COATINGS

PART1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints. stains. varnishes. and other coatings.

1.02 SCOPE: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:

A. All gypsum board shall receive primer coat, exposed and concealed.

B. Finish coats of paint shall extend 8" above suspended acoustical ceiling grid.

C. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
5. Glass.
6. Concealed pipes, ducts, and conduits.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products, including VOC content.

C. Samples: Submit two paper chip samples, illustrating range of colors and textures available for each surface finishing product scheduled.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work as described in this section, with minimum three years' experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers: inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

F. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Duron, Inc: www.duron.com.
   2. ICI Paints: www.icipaintsinna.com.
   3. Benjamin Moore & Co: www.benjaminmoore.com.
   4. Sherwin Williams: www.sherwin-williams.com

C. Transparent Finishes:
   1. Base Manufacturer: ICI Paints.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND COATINGS- GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each coating material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Volatile Organic Compound (VOC) Content:
   1. Provide coatings that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

2.03 PAINT SYSTEMS·EXTERIOR

A. PVC trim (paintable), Opaque, 2 Coat plus primer:
   1. PVC Primer
   2. Two coats of 100% acrylic paint-flat finish.

2.04 PAINT SYSTEMS·INTERIOR

A. Wood, Opaque, Latex, 2 Coat:
   1. One coat of latex primer sealer.
   2. Semi-gloss: One coat of latex enamel.
   3. Eggshell: One coat of latex enamel
   .

B. Ferrous Metals, Primed, Alkyd, 2 Coat (HM doors, frames & lintels):
   1. Touch-up with alkyd primer.
   2. Gloss: Two coats of alkyd enamel; .

C. Gypsum Board, Latex-Acrylic, 2 Coat:
   1. One coat of alkyd primer sealer.
   2. Semi-gloss: One coat of latex-acrylic enamel; .
   3. Eggshell: One coat of latex-acrylic enamel; .

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

PART 3 EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

H. Interior Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

I. Exterior Siding and Trim to Receive Opaque Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes per manufacturer's instructions.

3.02 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Sand wood and metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

G. Reinstall electrical *cover* plates, hardware, light fixture trim, escutcheons, and fittings *removed* prior to finishing.

END OF SECTION 09 9100

SECTION 10 1100
MARKERBOARDS AND TACKBOARDS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Work included: Provide markerboards for erasable dry-type and liquid type markers as indicated on the drawings.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Section in Division 1 of their Specifications.
2. Section 06 1000 - Rough Carpentry
3. Section 09 2100 - Gypsum Wallboard System

1.2 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 SUBMITTALS

A. Comply with pertinent provision of Section 01 3000.

B. Submit the following:

1. Materials list of items proposed to be provided under this Section;
2. Manufacturer's Specifications and other date needed to prove compliance with the specified requirements;
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades;
4. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

PART 2 – PRODUCTS

2.1 BASIS OF DESIGN

A. For purposes of establishing levels of quality Claridge products are named herein below. Approved equal manufacturers are listed in this Section.

2.2 APPROVED EQUAL MANUFACTURERS:

1. Claridge Products and Equip. Inc.
2. Greensteel Inc.
3. Polyvision Corporation.
4. Best-Rite Manufacturing

2.3 MARKERBOARDS: Provide markerboards in sizes and quantities as shown on drawings.

A. Markerboards shall be Claridge, Series 3, or approved equal, prefabricated markerboards factory laminated assembly of 3-ply construction consisting of backing sheet, core material, and Porcelain-enamel sheet with glass finish. Trim shall be extruded aluminum 6063-T5 alloy frame complete with chalk tray and map/display rail with cork insert. Provide concealed, continuous hangers as required. Color of marker board shall be selected by the Architect. Aluminum trim shall be standard satin finish clear anodized.

1. Face sheet: 0.0209-inch to 0.024-inch "Vitracite" porcelain enamel clad, Type 1, stretcher-leveled aluminized-steel face sheet. Fuse porcelain enamel coating to steel at approximately 1000 deg. F.
2. Core: 3/8 (9.5mm) thick particle board (non-urea-formaldehyde) with backing.
3. Backing sheet: 0.015-inch thick aluminum sheet
4. Laminating Adhesive: Moisture-resistant thermoplastic-type
5. Marker Tray: Manufacturer's standard, continuous aluminum. Also, Box-type marker tray with slanted front and cast-aluminum end closures.

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. In accordance with manufacturer's directions.

END OF SECTION 10 1100

SECTION 10 2113

PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.02 SUBMITTALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, illustrating panel finish, color, and sheen. E. Manufacturer's Installation Instructions: Indicate special procedures.

1.03 COORDINATION

1.04 A. Coordinate the work with placement of support framing and anchors in wall.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Toilet Compartments:
1. Ampco Products, Inc: www.ampco.com.
2. Comtec Industries: www.comtecindustries.com.
3. Santana Products Co., Inc: www.hinyhider.com.
4. Substitutions: Section 01 6000- Product Requirements.

2.02 COMPONENTS

A. Toilet Compartments: Solid molded plastic panels, doors, and pilasters, floor-mounted headrail-braced.
1. Color: from manufacturer's standard color palette.

B. Door and Panel Dimensions:
1. Thickness: 1 inch.
2. Door Width: 24 inch.
3. Door Width for Handicapped Use: 36 inch, out-swinging.
4. Height: 58 inch.
5. Thickness of Pilasters: 1 inch.

2.03 ACCESSORIES

A. Wall Brackets: Continuous type, polished stainless steel. B. Hardware: Satin stainless steel:
1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
2. Door Latch: Slide type with exterior emergency access feature.
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.
5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

3.02 INSTALLATION

A. Install partitions secure. rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch. B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 2113

SECTION 10 2800
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Grab bars.

1.02 RELATED REQUIREMENTS

A. Section 10 2113 - Plastic Toilet Compartments.

B. Section 06 1000- Rough Carpentry

1.03 REFERENCE STANDARDS (Latest Editions)

A. ASTM A 269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service;

B. ASTM A 653/A 653M -Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process;

C. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar;

D. ASTM B 456 -Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium;

E. ASTM C 1036- Standard Specification for Flat Glass;

F. ASTM F 2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use

G. GSA CID A-A-3002 - Mirrors, Glass; U.S. General Services Administration;

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.06 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Accessories:
   1. American Specialties, Inc: www.americanspecialties.com.
   2. Bradley Corporation: www.bradleycorp.com.
   3. Bobrick Washroom Equipment.
   4. Substitutions: Section 01 6000 - Product Requirements.

B. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories -General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 2 keys for each accessory to Owner; master key all lockable accessories. C.

   Stainless Steel Sheet: ASTM A 666, Type 304.

D. Stainless Steel Tubing: ASTM A 269, Type 304 or 316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M, with G90/Z275 coating.

F. Mirror Glass: Float glass, ASTM C 1036 Type I, Class 1, Quality 02, with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with GSA CID A-A-3002.

G. Adhesive: Two component epoxy type, waterproof.

H. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.

I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

2.04 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser: Multi- roll, surface mounted with concealed auto drop down roll stainless steel, satin finish with tumbler lock.

B. Combination fold paper towel Dispenser/Waste Receptacle: Semi-recessed with projecting waste receptacle, satin stainless steel; seamless wall flanges, continuous piano hinges, tumbler locks on upper and lower doors.
   1. Towel dispenser capacity: 400 C-fold.
   2. Waste receptacle capacity: 4 gallons.

C. Soap Dispenser: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and horizontal stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
   1. Minimum Capacity: 40 ounces.

D. Mirrors: Stainless steel framed, 6 mm thick float glass mirror.
   1. Size: As noted on drawings.
   2. Frame: 0.5 inch, with mitered and welded and ground corners, and tamperproof hanging

system; No.4 finish.

3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.

E. Grab Bars: Stainless steel, 1-1/4 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, concealed flange mounting; 1-1/2 inches clearance between wall and inside of grab bar.

1. Length and configuration: As indicated on drawings.

F. Sanitary Napkin Dispenser: Satin Stainless steel, semi-recessed, coin operated (free option), with tumbler lock.

G. Sanitary Napkin Disposal Unit: Satin stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

H. Mop and Broom Holder: 24" wide, 3 mop capacity, anti-slip spring-loaded holders, stainless steel, satin finish.

I. Coat Hooks: Provided by Toilet Partition manufacturer. See Section 10 2113.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. See drawings and Section 06 1000 for installation of blocking, reinforcing plates, and concealed anchors in walls, and ceilings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights and Locations: as indicated on drawings and according to the ICC A 117.1-2009 and North Carolina Building Code 2012.

END OF SECTION 10 2800

SECTION 10 4250
SIGNAGE AND GRAPHICS

PART 1 – GENERAL

1.01 DESCRIPTION OF THE WORK:

A. This section includes the following types of signs:
   1. Type A: Permanent room identification plaque
   2. Type B: Restroom identification Plaque
   3. Type C: Project Sign

1.02 SUBMITTALS

A. Product Data: Include manufacturer's construction details relative to materials, dimensions of individual components, profiles, and finishes for each type of sign required.

B. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, and reinforcement, accessories, layout, and installation details.

C. Samples: Provide actual color samples and sample of signs.

D. Quality Assurance: Obtain signs from one single source manufacturer.

PART 2 - PRODUCTS

2.01 ROOM IDENTIFICATION SIGNS, INFORMATIONAL SIGNS.

A. Signage shall be as manufactured by Mohawk Sign Systems, Schenectady, NY, Series 200A, Format D, in colors to be selected by the Architect. Additional acceptable manufacturers are as follows:
   1. Advance Corporation
   2. ASI Sign Systems, Inc.
   3. Best Manufacturing Co.
   4. Accu Sign, Inc.; Rowmark Ultra-Mattes

2.02 SIGN TYPES:

A. Type A: Permanent Room Identification Plaque
Material 8"x 8" with 1/32" high raised letters and Braille.

B. Type B: Restroom Identification Plaque
Material 8"x 8" with 1/32" high raised letters.

C. Project Sigh: Painted Exterior Plywood for project identification during construction

2.03 GRAPHIC PROCESS

A. All signs shall be manufactured using Graphic Process Series 200A – Sand Carved® using Format D.
   1. Tactile characters shall be raised the required 1/32" inches from sign face. Glue-on letter or etched backgrounds are not acceptable.
   2. All text shall be accompanied by Grade 2 braille. Braille shall be separated ½: from the corresponding raised characters or symbols. Grade 2 braille translation to be provided by signage manufacturer.
   3. Perimeter borders shall be 3/8". (optional)
   4. All letters, numbers and/or symbols shall contrast with their background. Characters and background shall have a non-glare finish.

B. Plaque material shall be melamine plastic laminate, approximately 1/8" thick with contrasting core color. The melamine shall be non-static, fire-retardant and self-extinguishing. The plastic laminate will be impervious to most acids, alkalies, alcohol, solvents, abrasives and boiling water.

C. Letterform shall be (Gill Sans upper case or other san serif or simple serif letterforms).

D. Size of letters and numbers shall be as follows:
   1. Room numbers shall be 1".
   2. Lettering for room ID signs shall be ¾".
   3. Symbol size shall be 4".
   4. Standard Grade 2 braille shall be ½" below copy.

E. Copy position: (CC (centered/centered) or as indicated on drawings.

2.04 SIGN SIZE

A. Room signs, will be 8'X8" with room number and name. Confirm room number prior to fabrication.

B. Restroom signs shall be design ADA-4. Size 8'X8" with a 4" accessibility symbol, gender symbol and the verbal description placed directly below followed by Grade 2 braille.

C. Corners: ½" radius

D. See Typical Sign layouts this section.

PART 3 - EXECUTION

3.01 INSTALLATION

A. In accordance with manufacturer's directions for type of mounting required at height and location indicated, and/or to comply with applicable regulations of governing authorities.

B. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

C. Wall Mounted Signs: Attach signs using liquid silicone adhesive recommended by the sign

manufacturer to attach sign units to irregular or porous surfaces. Use double-sided vinyl tape where recommended by the sign manufacturer to hold the sign in place until the adhesive has fully cured.

D. Cleaning and Protection: At completion of the installation operation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

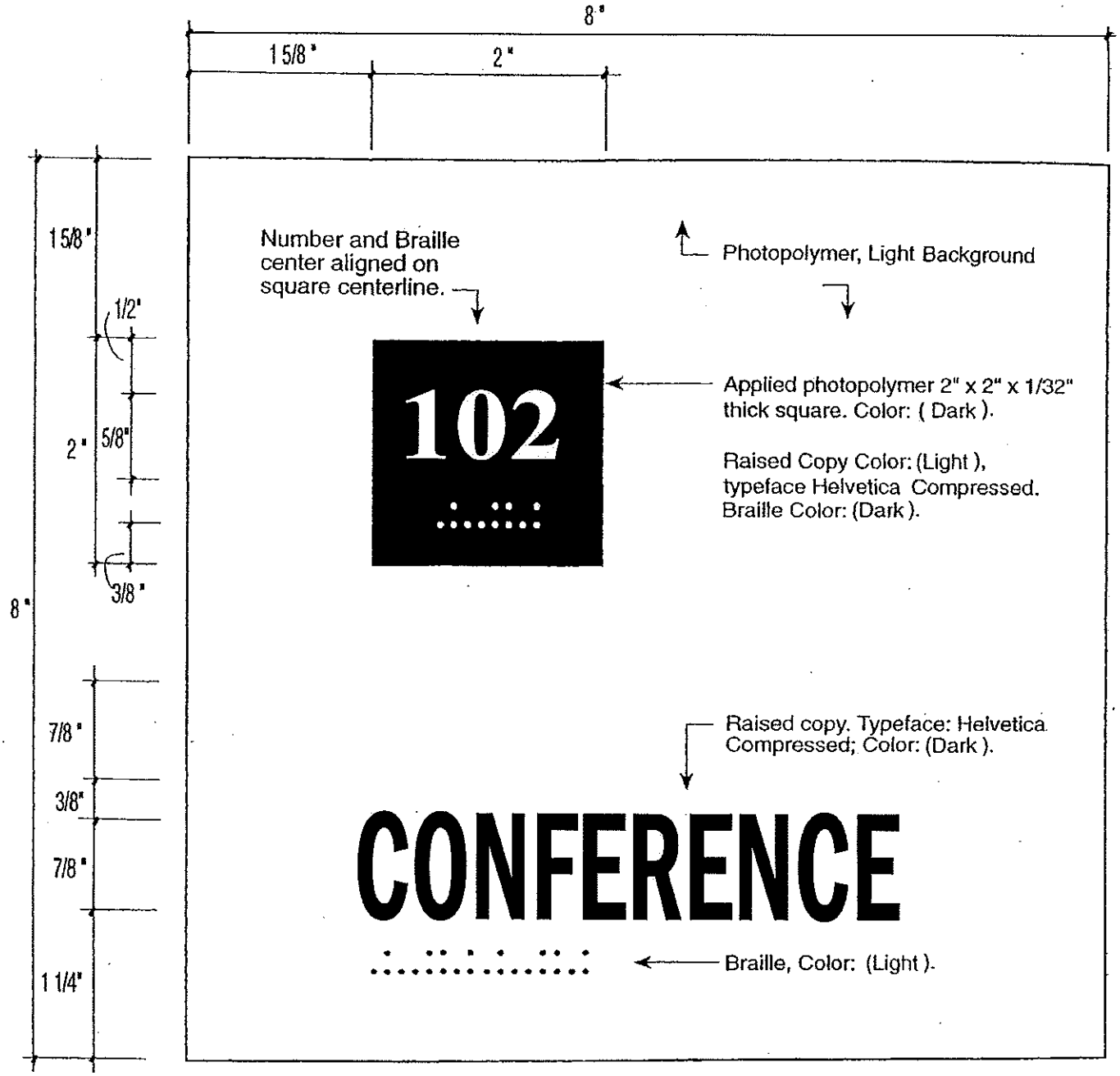
3.02 SIGNAGE SCHEDULE

Sign Type:	Copy:	Remarks:
A	116 CONFERENCE (Braille for CONFERENCE)	Mount at 5' – 0" AFF to center line adjacent to jamb
B	WOMEN (Braille for WOMEN)	Mount at 5' – 0" AFF to center line adjacent to jamb
B	MEN (Braille for MEN)	Mount at 5' – 0" AFF to center line adjacent to jamb

3.03 SIGNAGE DETAILS

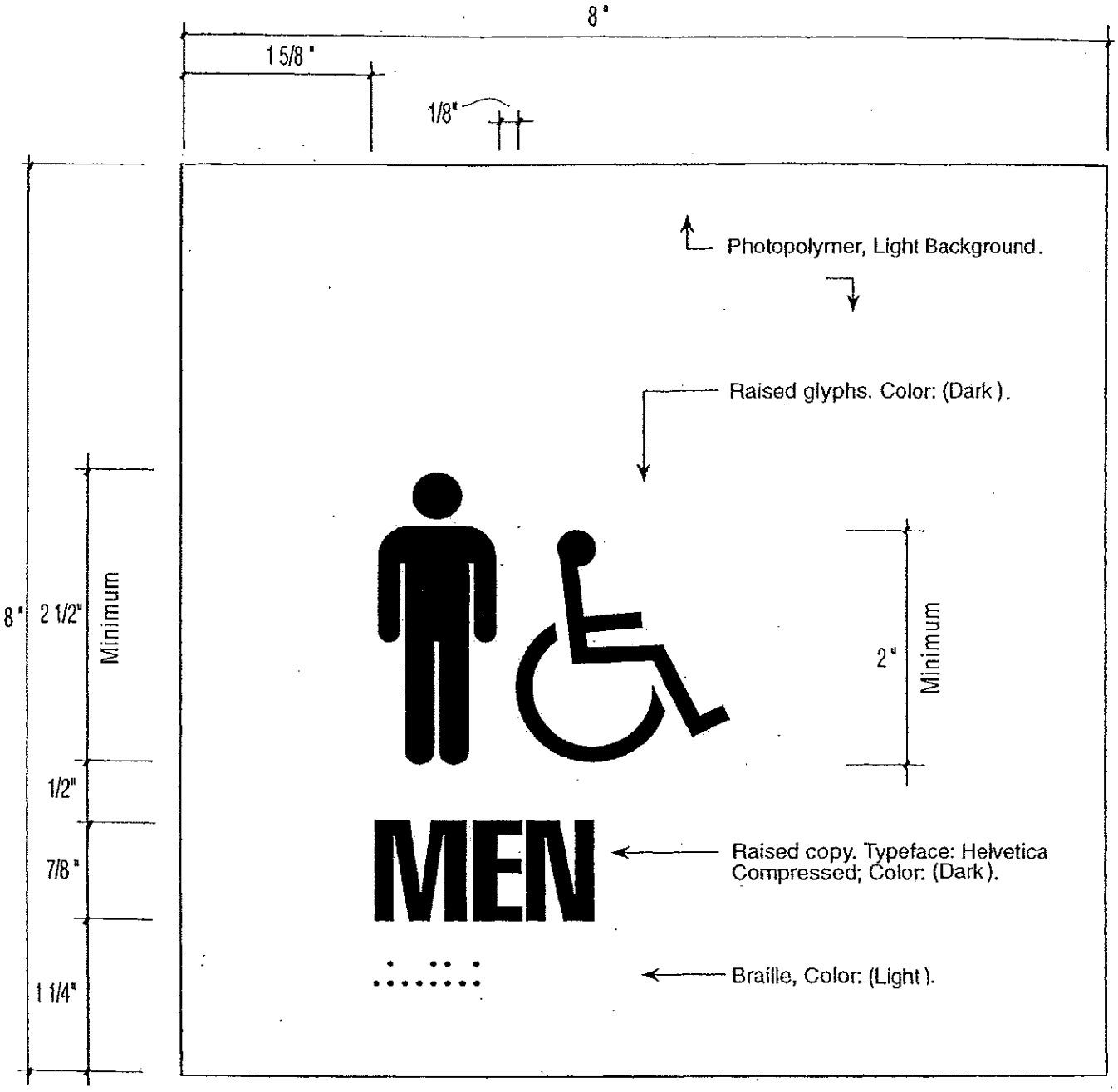
A. Details of Sign Types A, B, and Project Sign appear on the following pages.

END OF SECTION 10 4250



SCALE: 3/4" = 1"

Sign Type A Permanent Room Identification Plaque



SCALE: 3/4" = 1"

Sign Type B Restroom Identification Plaque

NEW HANOVER COUNTY
NCDOT DIVISION 3
OFFICE BUILDING

NC DEPARTMENT OF TRANSPORTATION

ARCHITECT / ENGINEER:

FACILITIES DESIGN

Burnette • Chalk Architecture & Planning, P.A.,
Morehead City, NC
Stroud Engineering,
Greenville & Wilmington, NC
NCDOT, Raleigh, NC

CONTRACTORS:

General: Contractor
Plumbing: Subcontractor
HVAC: Subcontractor
Electrical: Subcontractor
Landscape Site: Subcontractor

5" HIGH COPY

2" HIGH COPY

1-1/2" HIGH COPY

5" HIGH COPY

2" HIGH COPY

1-1/2" HIGH COPY

2" HIGH COPY

HELVETICA MED. STYLE

ALL COPY# 70YY 37/121

PROJECT SIGN

4' x 6' x 3/4" EXTERIOR PLYWOOD, PAINTED White, 30GY 88/014 BACKGROUND W/2- 4" x 4" TREATED WOOD POSTS (3' BELOW GRADE), BOTTOM OF SIGN PANEL 3' ABOVE GRADE.

COLORS:# 30GG 09/106, "New England Green" (GLIDDEN)- COPY, 98YY 82/022, "White High-Hiding RM (GLIDDEN)-BACKGROUND

END OF SECTION 10 4250

SECTION 10 4413
FIRE EXTINGUISHER & CABINETS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes fire protection cabinets for fire extinguishers.

1.2 UL LISTED PRODUCTS
A. Provide new UL listed fire extinguisher bearing UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
C. Samples: For each exposed product and for each color and texture specified.
D. Maintenance data.

1.4 QUALITY ASSURANCE
A. Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER (FE)
A. Fire extinguishers shall be 10 pound ABC (MP-10). Furnish with nozzles.

2.2 FIRE PROTECTION CABINET
A. Cabinet Type: Semi-recessed suitable for fire extinguisher.
1. Products: Subject to compliance with requirements, provide one of the following:
a. J. L. Industries, Inc., a division of Activar Construction Products Group.
b. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
c. Larsen's Manufacturing Company
d. Modern Metal Products, Division of Technico Inc
B. Cabinet Construction: Non rated
C. Cabinet Material: Clear anodized aluminum sheet or stainless steel.
D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
1. Rolled-Edge Trim: 2-1/2" backbend depth.
E. Cabinet Trim Material: Clear anodized aluminum

F. Door Material: Clear anodized aluminum
G. Door Style: Full view panel.
H. Door Glazing: Acrylic
I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
J. Accessories:
   1. Mounting Bracket: Manufacturer's standard designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
   3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated and verified by authorities having jurisdiction.
      a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER"
         1) Location: Applied to cabinet glazing
         2) Application Process: Silk-screened
         3) Lettering Color: Red
         4) Orientation: Vertical
K. Finishes:
   1. Aluminum: Anodized
      a. Color: CLear

2.3 FABRICATION
A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION OF CABINETS (SEMI-RECESSED)
A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
B. Install fire protection cabinets in locations and at mounting heights at heights acceptable to authorities having jurisdiction.
C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
D. Identification: Factory applied at locations indicated.
E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 4413

SECTION 10 6730
METAL SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Free standing metal shelving system.

1.02 RELATED REQUIREMENTS

A. Section 09 8000 – Chemically Resistant Epoxy Flooring

B. Section 09 9100 – Paints and Coatings

1.03 SUBMITTALS

A. See Sections 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.

C. Layout Drawings: Drawings indicating sizes and layout of shelving units.

D. Provide copy of manufacturer's warranty.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store products under cover and elevated above grade.

B. Store products in manufacturer's unopened packaging until ready for installation.

1.05 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Furnish 6 extra endcaps for top and bottom of vertical supports.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Accepted Manufacturer
   1. EDSAL Manufacturing Co.
   2. Tennsco
   3. Lyon

B. Substitutions: See Section 01 6000 - Product Requirements

2.02 SHELVING

A. High Capacity Boltless Shelving, EDSAL, Model #HCU-481896 (verify lengths) or approved equal.
   1. 84" height with 5 adjustable steel shelves
   2. 18" depth
   3. 2500 lb. capacity min.
   4. Steel construction with powder coated finish.
   5. Protective caps for exposed steel edges for vertical supports at top and bottom.
   6. Color to be selected from standard colors available from manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Set units plumb and level. Install unit couplers if needed for stability.

3.02 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before final acceptance.

END OF SECTION 10 6730

SECTION 11 1200
TRAFFIC CONTROL

PART I GENERAL

1.01 DESCRIPTION OF WORK

A. Traffic control shall consist of furnishing all barricades, signs, traffic control devices, detours, surfaces, or personnel to conduct traffic safely and adequately through the construction site, in conformity with the requirements of these Specifications, NCDOT Standard Specifications and the latest Manual on Uniform Traffic Control Devices (MUTCD) and any local jurisdictions Traffic Control Standards.

1.02 TRAFFIC-CONSTRUCTION INTERFERENCE

A. The Contractor shall not interfere with traffic between the hours of 7:30 a.m. to 9:00 a.m. and 3:30p.m. to 6:30 p.m. on weekdays or at anytime on weekends or holidays without written permission from the Project Manager. This applies not only to work affecting traffic, but also to any work occurring within the medians or right-of-way. The Contractor shall not park construction equipment or personal vehicles on or near any lanes open to traffic, or at any location that may interfere with the safe movement of traffic. When traffic control is required within a signalized intersection, the Contractor shall provide an off duty, uniformed, Police Officer at the Contractor's expense. Request for officers must be made directly through the local City or Town per their stated regulations.

1.03 PERSONNEL

A. The Contractor shall provide a traffic control person other than the project superintendent when called for in the plans or in the Special Conditions. The traffic control person shall:

- Have traffic control as his primary duty.
- Carry a valid flagging certificate (recognized by the North Carolina Department of Transportation).
- Be on the job site at all times during working hours. Check all barricades and warning signs periodically and at the end of each day and on weekends.
- Verify that all traffic control devices are in accordance with the latest edition of the MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
- Verify that all traffic control devices are properly aligned, operational, and positioned according to the traffic control plan.
- Remove any traffic control device that is no longer needed.
- Verify that all flagmen have an orange vest, hard hat, and stop/slow paddle.
- Maintain two-way traffic on existing pavement unless specified otherwise by the Traffic Engineer.
- Be on call 24 hours per day and provide home phone to NCDOT Engineer.

1.04 REQUIRED APPROVALS

A. The Contractor shall contact the NCDOT Engineer or his designee at least seventy-two (72) hours before starting work in a public street right-of-way or near a signalized intersection. The

Contractor shall obtain approval from NCDOT or local Jurisdiction Traffic Engineer for any lane or street closure or any change in the flow of traffic within the Public Right-of- Way (ROW). If the Contractor desires to revise the approved traffic handling plan, he shall submit his proposal to the Engineer and allow one (I) week to review the proposal. The Traffic Engineer will approve a plan that in his opinion provides adequately for the safety and convenience of the public and provides the same or greater service as the previously approved plan.

B. Any street closings that are not affecting public street right-of-ways shall occur only after 72-hour advance notice in writing to the Project Manager.

1.05 STRIPING AND SIGNS

A. The Contractor shall be responsible for all temporary traffic stnpmg, removal and/or resetting of existing traffic control devices (signs) and upon completion, final traffic striping and signing. The Project Manager shall be notified by Contractor, at minimum, forty-eight (48) hours in advance of removal or resetting of signs and seventy-two (72) hours in advance for temporary striping.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION 11 1200

SECTION 12 2113
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Horizontal slat louver blinds.

B. Operating hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

A. WCMA A100.1 - Safety of Corded Window Covering Products; Window Covering Manufacturers Association; 2007 Latest edition)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the placement of concealed blocking to support blinds.

1.05 SUBMIITALS

A. See Section 01 3000 -Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating physical and dimensional characteristics.

C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.

D. Samples: Submit two samples, 4 inch long minimum illustrating slat materials and finish, color, cord type and color.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000- Product Requirements, for additional provisions.

1.06 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Horizontal Louver Blinds:
   1. Hunter Douglas: www.hunterdouglas.com.
   2. Levolor Contract: www.levolorcontract.com.
   3. Graber, division of Springs Window Fashions: www.graberblinds.com.
   4. Substitutions: See Section 01600 - Product Requirements.

2.02 BLINDS AND BLIND COMPONENTS

A. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand; complying with WCMA A100.1.

B. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing

burrs removed.

1. Width: 1 inch.
2. Color: Architect to choose from manufacturer's standard pallatte. All blinds will be the same color.

C. Slat Support: Woven polypropylene cord, ladder configuration.

D. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats
   1. Color: Same as slats .

E. Bottom Rail: Pre-finished, formed wood with top side shaped to match slat curvature; with end caps. Color: Same as headrail.

F. Lift Cord: Braided nylon; continuous loop.
   1. Free end weighted.
   2. Color: Standard color that accompanies slat color.

G. Control Wand: Extruded hollow plastic; hexagonal shape.
   1. Non-removable type.
   2. Color: Manufacturers standard, for slat color, or clear .

H. Headrail Attachment: Wall brackets.

I. Accessory Hardware: Type recommended by blind manufacturer.

2.03 **FABRICATION**

A. Determine sizes by field measurement.

B. Fabricate blinds to fit inside of window frame

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that openings are ready to receive the work.

B. Ensure structural blocking and supports are correctly placed.

3.02 **INSTALLATION**

A. Install blinds in accordance with manufacturer's instructions. B. Secure in place with flush countersunk fasteners.

3.03 **ADJUSTING**

A. Adjust blinds for smooth operation.

3.04 **CLEANING**

A. Clean blind surfaces just prior to occupancy.

3.05 **SCHEDULE**

A. All windows in exterior walls are to receive blinds.
   1. Nominal Opening Size: See Architectural Drawings
   2. Color: To be chosen by Architect from manufacturer's standard color palette

END OF SECTION 12 2113

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Ceiling markers.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Valves: Tags Color Coded Above Ceiling Valve Markers.

B. Adhesive vinyl ceiling grid valve markers with 3/4" diameter color coded heads.

2.02 CEILING VALVE MARKERS

A. Manufacturers:
   1. Craftmark; Ceiling Grid Valve Markers: www.craftmarkid.com.
   2. Seton Identification Products.
   3. Mifab, Inc.
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: Rigid vinyl pressure sensitive adhesive to stick to ceiling grid with 3/4 inch head.

C. Color code as follows:
   1. HVAC Equipment: Yellow.
   2. Fire Dampers and Smoke Dampers: Red.
   3. Plumbing Valves: Green.
   4. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 INSTALLATION

A. Locate ceiling markers to locate valves or dampers above lay-in panel ceilings. Locate in grid closest to equipment.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

B. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing; 2010.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.07 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

2.02 SURFACE BURNING CHARACTERISTICS: FLAME SPREAD INDEX/SMOKE DEVELOPED INDEX OF 25/50, MAXIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc: www.aeroflexusa.com.
   2. Armacell LLC: www.armacell.us.
   3. K-Flex USA LLC: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.

2. Maximum Service Temperature: 220 degrees F.
3. Connection: Waterproof vapor barrier adhesive.

2.04 JACKETS

A. PVC Plastic.
1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
a. Minimum Service Temperature: 0 degrees F.
b. Maximum Service Temperature: 150 degrees F.
c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
d. Thickness: 10 mil.
e. Connections: Brush on welding adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

C. Inserts and Shields:
1. Application: Piping 1-1/2 inches diameter or larger.
2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Insert Location: Between support shield and piping and under the finish jacket.
4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.

D. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

3.03 SCHEDULES

A. Plumbing Systems:
1. Domestic Hot and Cold Water Supply:
a. Flexible Elastomeric Insulation
1) Plumbing Domestic Water Piping
2) 3/4" thickeness in unconditioned spaces. 1/2" in conditioned spaces.
3) 1" thickness for hot water return piping.
2. Domestic Hot Water Recirculation:
a. Flexible Elastomeric Insulation:
1) Thickness 1" in accordance with NCSBC Energy Conservation.
3. Plumbing Vents Within 5 Feet of the Exterior:
a. 1" Flexible Elastomeric Insulation.

B. Other Systems:
1. Insulate Supplies and Drains under Sinks and Lavatories to Comply with ADA Requirements:

END OF SECTION

SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Natural Gas.
   4. Flanges, unions, and couplings.
   5. Pipe sleeves
   6. Pipe hangers and supports.
   7. Valves.

1.02 RELATED REQUIREMENTS

A. Section 08 3100 - Access Doors and Panels.

B. Section 22 0719 - Plumbing Piping Insulation.

C. Section 31 2316.13 - Trenching.

D. Section 31 2323 - Fill.

E. Section 33 1300 - Disinfecting of Water Utility Distribution.

1.03 REFERENCE STANDARDS

A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems; 1999, and addenda A&B (R2004).

B. ANSI Z223.1 - National Fuel Gas Code; 2015.

C. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2011.

D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2011.

E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

F. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

G. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.

H. ASME B31.1 - Power Piping; 2014.

I. ASME B31.9 - Building Services Piping; 2014.

J. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Qualifications; 2015.

K. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings; 1999 (Reapproved 2014).

L. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

M. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings; 2015.

N. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2015.

O. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

P. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.

Q. ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed; 2011.

R. ASTM B75/B75M - Standard Specification for Seamless Copper Tube; 2011.

S. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

T. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

U. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings; 2014.

V. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

W. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2013.

X. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

Y. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.

Z. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe; 2010.

AA. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

AB. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing; 2013a.

AC. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems; 2011.

AD. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe; 2011.

AE. ASTM F1282 - Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe; 2010.

AF. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing; 2015.

AG. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

AH. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

AI. AWWA C651 - Disinfecting Water Mains; 2005.

AJ. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.

AK. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.

AL. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.

AM. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

AN. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

AO. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.

AP. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

AQ. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; 2013.

AR. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; 2010.

AS. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

AT. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Project Record Documents: Record actual locations of valves.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with applicable codes.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

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

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

1.07 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301, hubless, service weight.
   1. Fittings: Cast iron.
   2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.

B. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, for fixture arms:
   1. Threaded Joints: ASME B16.4 cast iron fittings.

C. PVC Pipe: ASTM D2665.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, soft annealed, type K.
   1. Fittings: ASME B16.26, cast bronze.
   2. Joints: Flared.
   3. Copper pipe below ground, 3" and smaller shall be type "K" soft annealed copper tubing with silver brazed joints where approved. There shall be no joints permitted underground or under the building slab without Engineer's approval.

B. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
   1. Joints: Mechanical compression fittings.
   2. Joints: ASTM F1960 cold-expansion fittings.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L, Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder for joints1-1/4" and smaller. Silverbraze tube joints larger than1-1/4".
   3. Mechanical Press Sealed Fittings: Double pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.

B. Steel Pipe: ASTM A53/A53M Schedule 40, galvanized, using one of the following joint types:
   1. Threaded Joints: ASME B16.4 cast iron fittings.
   2. Schedule 40 galvanized steel with threaded fittings for fixture arms

C. Cross-Linked Polyethylene (PEX) Pipe: ASTM F876 or ASTM F877.
   1. Fittings: Brass and copper.
   2. Fittings: Brass and engineered polymer (EP) ASTM F1960.
   3. Joints: Mechanical compression fittings.
   4. Joints: ASTM F1960 cold-expansion fittings.

2.06 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

2.07 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 Inches and Under:
   1. Copper tube and pipe: Class 150 bronze unions with soldered joints.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.08 PIPE SLEEVES

A. Where piping passes through building foundations or structural walls, provide pipe sleeves. Sleeves shall be steel pipe, one size larger or sufficient to provide a minimum of 1/2" clearance between pipe and sleeve. The annular space between the pipe and sleeve shall be packed with backing rod and sealed on both sides with siicone caulk.

2.09 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
   5. Floor Supports: Concrete pier or steel pedestal with floor flange; fixture attachment.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

4. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
6. Other Types: As required.

2.10 UNDERGROUND WARNING TAPE: NON-DETECTABLE POLYETHYLENE STYLES FOR METALLIC PIPE OR DETECTABLE FOR NONMETALLIC PIPE.

2.11 BALL VALVES

A. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

B. Ball valves for natural gas service shall be indicated for this service.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

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

C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

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

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

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
1. Refer to Section 22 0719.

G. Provide access where valves and fittings are not exposed.

H. Excavate in accordance with Section 31 2316.13

I. Backfill in accordance with Section 31 2316.13

J. Underground piping, except lawn irrigaion lines shall have printed durable plastic warning tapes identifying buried piping below. Nonmetallic pipes (PE, PVC) shall be identified by magnetic type methods such as detectable tape or tracer wire.

K. Install water piping to ASME B31.9.

L. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

M. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

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

O. Inserts:
   1. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

P. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Provide copper plated hangers and supports for copper piping.

3.04 APPLICATION

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

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 TESTING OF SANITARY WASTE PIPING

A. Testing of sanitary waste piping shall be in accordance with the NCSBC Plumbing Section 312.

B. The minimum head test on DWV piping shall be 10 feet of water head and there shall be no sign of leakage for the test period of 15 minuutes.

3.07 PRESSURE TESTING OF DOMESTIC WATER PIPING

A. Pressure test water piping in accordance with the NCSBC Plumbing Section 312; and as stated within, the test shall be with water at 100 psig and hold time without leakage is 15 minutes.

3.08 PRESSURE TESTING, INSPECTION, AND PURGING OF NATURAL GAS PIPING

A. Pressure testing, inspection and purging shall be in accordance with NCSBC Fuel Gas Code, Section 406. Purging shall terminate outsie of the building. Prior to acceptance, natural gas piping shall be pressure tested with nitrogen to 1-1/2 times the maximum working pressure and not less than 3 PSIG and held for a minimum period of 1/2 hour. There shall be no reduction of pressure indicated by mechanical gauge with range no greater than 5 times the test pressure.

3.09 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Per GS-130A Article 10 all new, altered or repaired potable water lines shall be thoroughly flushed and disinfected by means of hypochlorine solution, after which bacteriological test samples shall be collected. Bacteriological testing for quality of the domestic water shall be conducted by independent and EPA approved laboratory, accepted by the Project Engineer, and submitted to the State Construction Office prior to requesting the building occupancy permit. Procedure to disinfect the water system is as provided in the following paragraphs.

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

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

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

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.10 SERVICE CONNECTIONS

A. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves..
   1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.

3.11 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.
      d. Pipe Size: 4 inches to 6 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 5/8 inch.
   2. Plastic Piping:
      a. All Sizes:
         1) Maximum Hanger Spacing: 6 ft.
         2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.

B. Cleanouts.

C. Hose bibbs.

D. Hydrants.

E. Water hammer arrestors.

F. Escutcheons

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping.

B. Section 22 4000 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).

C. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.

D. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.

E. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.

F. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

G. NSF 372 - Drinking Water System Components - Lead Content; 2011.

H. PDI-WH 201 - Water Hammer Arresters; 2010.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Floor Drain:

1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 CLEANOUTS

A. Cleanouts at Exterior Surfaced Areas (XCO):
   1. Round cast nickel bronze access frame and non-skid cover.

B. Cleanouts at Interior Finished Floor Areas (CO):
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

C. Cleanouts at Interior Finished Wall Areas (WCO):
   1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.04 HOSE BIBBS

A. Interior Hose Bibbs:
   1. Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in conformance with ASSE 1011.

2.05 HYDRANTS

A. Wall Hydrants:
   1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.06 WATER HAMMER ARRESTORS

A. Water Hammer Arrestors:
   1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.07 ESCUTCHEONS

A. Provide Chrome Plated Escutcheons where at pipe wall penetations in exposed locations.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

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

C. Encase exterior cleanouts in concrete flush with grade.

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

E. Install approved portable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

F. Pipe relief from backflow preventer to nearest drain.

G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to water closets and urinals with flush valves.

H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION

SECTION 22 3001

PLUMBING POINT OF USE TYPE WATER HEATERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial electric.

B. Commercial Small Capacity Point of Use Water Heaters.

C. Expansion tanks.

1.02 RELATED REQUIREMENTS

A. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

B. ICC (IPC) - International Plumbing Code; 2015.

C. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

D. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate support framing size, geometry, and materials.
   3. Provide electrical characteristics and connection requirements.

C. Shop Drawings:
   1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

D. Manufacturer's Instructions: Electrical Pointof Use Type Water Heaters.

E. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide six year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATER MANUFACTURERS

A. A.O. Smith Water Products Co; EJC: www.hotwater.com.

B. Bradford White ElectroFlex: www.bradfordwhite.com

C. Rheem Manufacturing Company; PROE: www.rheem.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 CERTIFICATIONS

A. Water Heaters: NSF approved.

B. Electric Water Heaters: UL listed and labeled to UL 174 or UL 1453.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.03 COMMERCIAL ELECTRIC WATER HEATERS

A. Type: Factory-assembled and wired, electric, vertical storage.

B. Performance:
   1. Heating Element Size: as scheduled kW.
   2. Maximum Working Pressure: 150 psig.

C. Electrical Characteristics:
   1. 120 volts, single phase, 60 Hz.

D. Tank: Glass lined welded steel; 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

E. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.

F. Accessories: Provide:

G. Heating Elements: Flange-mounted immersion elements; individual elements sheathed with Incoloy corrosion-resistant metal alloy, rated less than 75 Watts per square inch.

2.04 DIAPHRAGM-TYPE COMPRESSION TANKS

A. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible Polypropylene diaphragm sealed into tank, and steel legs or saddles.

B. Accessories: Pressure gage and air-charging fitting, tank drain; precharge to 12 psig.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Domestic Water Storage Tanks:
   1. Provide steel pipe support, independent of building structural framing members.
   2. Clean and flush prior to delivery to site. Seal until pipe connections are made.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Service sinks.

F. Electric water coolers.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration; 2008.

C. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2002).

D. ASME A112.18.1 - Plumbing Supply Fittings; 2012.

E. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.

F. ASME A112.19.3 - Stainless Steel Plumbing Fixtures (Designed for Residential Use); 2008 (R2013).

G. ASME A112.19.4M - Porcelain Enameled Formed Steel Plumbing Fixtures; 1994 (R2004).

H. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2011.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

J. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

K. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

C. Manufacturer's Instructions: Indicate installation methods and procedures.

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

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Faucet Washers: One set of each type and size.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

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

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

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Bowl: ASME A112.19.2; 16.5 inches high with elongated rim.
   2. Flush Valve: Exposed (top spud).
   3. Flush Operation: Manual, oscillating handle.
   4. Handle Height: 44 inches or less.
   5. Supply Size: 1-1/2 inches.
   6. Color: White.
   7. Manufacturers:
      a. American Standard, Inc. www.americanstandard-us.com.
      b. Gerber Plumbing Fixtures LLC: www.gerberonline.com.
      c. Kohler Company: www.kohler.com.
      d. Zurn Industries, Inc: www.zurn.com.

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.
   2. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com.
      b. Sloan Valve Company: www.sloanvalve.com.
      c. Zurn Industries, Inc: www.zurn.com.

C. Seats:
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com.
      b. Bemis Manufacturing Company: www.bemismfg.com.
      c. Church Seat Company: www.churchseats.com.
      d. Olsonite: www.olsonite.com.
      e. Zurn Industries, Inc: www.zurn.com.
   2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, without cover.

2.03 WALL HUNG URINALS

A. Wall Hung Urinal Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com.
   2. Gerber Plumbing Fixtures LLC: www.gerberonline.com.
   3. Kohler Company: www.kohler.com.
   4. Zurn Industries, Inc: www.zurn.com.

B. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
   1. Flush Volume: 1.0 gallons, maximum.
   2. Flush Style: Washout.

3. Flush Valve: Exposed (top spud).
4. Trap: Integral.
5. Removable stainless steel strainer.
6. Supply Size: 3/4 inch.
7. Outlet Size: 2 inches.

C. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
   1. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.

D. Carriers:
   1. Manufacturers:
      a. JOSAM Company: www.josam.com.
      b. Zurn Industries, Inc: www.zurn.com.
   2. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.04 LAVATORIES

A. Lavatory Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com.
   2. Gerber Plumbing Fixtures LLC: www.gerberonline.com.
   3. Kohler Company: www.kohler.com.
   4. Zurn Industries, Inc: www.zurn.com.

B. Vitreous China Counter Top Basin: ASME A112.19.2; vitreous china self-rimming counter top lavatory, 18 by 12 inch with drillings on 4 inch centers, front overflow, soap depression, seal of putty, calking, or concealed vinyl gasket.

C. Vitreous China Under-Mount Basin: ASME A112.19.2; vitreous china under-mount lavatory, front overflow, mounting kit and template by manufacturer.

D. Supply Faucet: ASME A112.18.1; chrome plated combination supply fitting with open grid strainer, water economy aerator with maximum flow of 0.5 gallon per minute (low-flow), indexed handles.

E. Accessories:
   1. Chrome plated 17 gage, 0.0538 inch brass P-trap with clean-out plug and arm with escutcheon.
   2. Offset waste with perforated open strainer.
   3. Wheel handle stops.
   4. Rigid supplies.

2.05 ADA PROTECTION UNDER SINKS AND LAVATORIES:

A. Provide ADA compliant insulation packages for exposed piping under sinks and lavatories.

2.06 SINKS

A. Double Compartment Bowl: ASME A112.19.3; size as scheduled by size as scheduled by size as scheduled inch outside dimensions 20 gage, 0.0359 inch thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
   1. Drain: 1-1/2 inch chromed brass drain.

2.07 ELECTRIC WATER COOLERS

A. Water Cooler: Electric, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.

B. Bottle Filling Station: Provide where indicated in plans.
   1. Capacity: 8 gallons per hour of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F, when tested in accordance with ASHRAE Std 18.

2. Electrical: 115 V, 60 Hertz compressor, 6 foot cord and plug for connection to electric wiring system including grounding connector.

2.08 SERVICE SINKS

A. Mop Sink, Terrazo base, size as indicated in plans, wall mounted spigot. backsplash.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

3.02 PREPARATION

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

3.03 INSTALLATION

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

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

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

3.05 ADJUSTING

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

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Final Acceptance.

3.08 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
   1. Water Closet:
      a. Standard: 15 inches to top of bowl rim.
      b. Accessible: 18 inches to top of seat.
   2. Water Closet Flush Valves:
      a. Standard: 11 inches min. above bowl rim.
   3. Urinal:
      a. Accessible: 17 inches to top of bowl rim.
   4. Lavatory:
      a. Accessible: 34 inches to top of basin rim.

B. Fixture Rough-In
   1. Water Closet (Flush Valve Type):
      a. Cold Water: 1 Inch.
      b. Waste: 4 Inch.
      c. Vent: 2 Inch.
   2. Urinal (Flush Valve Type):
      a. Cold Water: 3/4 Inch.

b. Waste: 2 Inch.
c. Vent: 1-1/2 Inch.

3. Lavatory:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 1-1/2 Inch.
   d. Vent: 1-1/4 Inch.
4. Sink:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 1-1/2 Inch.
   d. Vent: 1-1/4 Inch.
5. Service Sink:
   a. Hot Water: 1/2 Inch.
   b. Cold Water: 1/2 Inch.
   c. Waste: 3 Inch.
   d. Vent: 1-1/2 Inch.
6. Bottle Water Dispenser:
   a. Cold Water: 1/2 Inch.
   b. Waste: 1-1/4 Inch.
   c. Vent: 1-1/4 Inch.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of refrigerating systems.

C. Measurement of final operating condition of HVAC systems.

D. Sound measurement of equipment operating conditions.

E. Commissioning activities.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Employment of testing agency and payment for services.

1.03 REFERENCE STANDARDS

A. AABC MN-1 - AABC National Standards for Total System Balance; 2002.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, Eighth Edition.

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Engineer.
   2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   3. Include certification that the plan developer has reviewed the contract documents, the equipment and systems, and the control system with the Engineer and other installers to sufficiently understand the design intent for each system.

D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Submit under provisions of Section 01 4000.
   2. Revise TAB plan to reflect actual procedures and submit as part of final report.
   3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
   4. 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.
   5. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   6. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   7. Units of Measure: Report data in I-P (inch-pound) units only.

8. Include the following on the title page of each report:
   a. Name of Testing, Adjusting, and Balancing Agency.
   b. Address of Testing, Adjusting, and Balancing Agency.
   c. Telephone number of Testing, Adjusting, and Balancing Agency.
   d. Project name.
   e. Project location.
   f. Project Engineer.
   g. Project Engineer.
   h. Project Contractor.
   i. Project altitude.
   j. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
   1. AABC MN-1, AABC National Standards for Total System Balance.
   2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
   3. SMACNA (TAB).

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.

D. TAB Agency Qualifications:
   1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
   2. Having minimum of three years documented experience.
   3. Certified by one of the following:
      a. AABC, Associated Air Balance Council: www.aabchq.com; upon completion submit AABC National Performance Guaranty.
      b. NEBB, National Environmental Balancing Bureau: www.nebb.org.
      c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org.

E. TAB Supervisor Qualifications: Professional Engineer licensed in the State in which the Project is located.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
   1. Systems are started and operating 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. Fans are rotating correctly.
   7. Access doors are closed and duct end caps are in place.
   8. Air outlets are installed and connected.
   9. Duct system leakage is minimized.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.03 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.04 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

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

C. Mark on the drawings the locations where traverse and other critical measurements were taken and cross reference the location in the final report.

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.

3.05 AIR SYSTEM PROCEDURE

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

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. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

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

3.06 COMMISSIONING

A. Perform prerequisites prior to starting commissioning activities.

B. Fill out Prefunctional Checklists for:
   1. Air side systems.
   2. Water side systems.

C. Furnish to the Commissioning Authority, upon request, any data gathered but not shown in the final TAB report.

D. Re-check minimum outdoor air intake flows and maximum and intermediate total airflow rates for 100 percent of the air handlers plus a random sample equivalent to 25 percent of the final TAB report data as directed by Commissioning Authority.
   1. Original TAB agency shall execute the re-checks, witnessed by the Commissioning Authority.
   2. Use the same test instruments as used in the original TAB work.
   3. Failure of more than 10 percent of the re-checked items of a given system shall result in the rejection of the system TAB report; rebalance the system, provide a new system TAB report, and repeat random re-checks.
   4. For purposes of re-check, failure is defined as follows:
      a. Air Flow of Supply and Return: Deviation of more than 10 percent of instrument reading.

b. Minimum Outside Air Flow: Deviation of more than 20 percent of instrument reading; for inlet vane or VFD OSA compensation system using linear proportional control, deviation of more than 30 percent at intermediate supply flow.
c. Temperatures: Deviation of more than one degree F.
d. Air and Water Pressures: Deviation of more than 10 percent of full scale of test instrument reading.
e. Sound Pressures: Deviation of more than 3 decibels, with consideration for variations in background noise.

5. For purposes of re-check, a whole system is defined as one in which inaccuracies will have little or no impact on connected systems; for example, the air distribution system served by one air handler or the hydronic chilled water supply system served by a chiller or the condenser water system.

E. In the presence of the Commissioning Authority, verify that:
1. Final settings of all valves, splitters, dampers and other adjustment devices have been permanently marked.
2. The air system is being controlled to the lowest possible static pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from fan to diffuser having all balancing dampers wide open and that during full cooling of all terminal units taking off downstream of the static pressure sensor, the terminal unit on the critical leg has its damper 90 percent or more open.
3. The water system is being controlled to the lowest possible pressure while still meeting design loads, less diversity; this shall include a review of TAB methods, established control setpoints, and physical verification of at least one leg from the pump to the coil having all balancing valves wide open and that during full cooling the cooling coil valve of that leg is 90 percent or more open.

F. No seasonal tests are required.

G. No further monitoring is required.

H. No deferred testing is required.

3.07 SCOPE

A. Test, adjust, and balance the following:
1. Unit Air Conditioners.
2. Air Handling Units.
3. Fans.
4. Air Filters.
5. Air Inlets and Outlets.

3.08 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
1. Manufacturer.
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.
6. Service factor.

B. Air Cooled Condensers:
1. Identification/number.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Entering DB air temperature, design and actual.
6. Leaving DB air temperature, design and actual.
7. Number of compressors.

C. Cooling Coils:
   1. Identification/number.
   2. Location.
   3. Service.
   4. Manufacturer.
   5. Air flow, design and actual.
   6. Entering air DB temperature, design and actual.
   7. Entering air WB temperature, design and actual.
   8. Leaving air DB temperature, design and actual.
   9. Leaving air WB temperature, design and actual.
   10. Air pressure drop, design and actual.

D. Return Air/Outside Air:
   1. Identification/location.
   2. Design air flow.
   3. Actual air flow.
   4. Design return air flow.
   5. Actual return air flow.
   6. Design outside air flow.
   7. Actual outside air flow.
   8. Return air temperature.
   9. Outside air temperature.

E. Exhaust Fans:
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Air flow, specified and actual.
   6. Total static pressure (total external), specified and actual.
   7. Fan RPM.

F. Duct Traverses:
   1. Duct size.
   2. Area.
   3. Design velocity.
   4. Design air flow.
   5. Test velocity.
   6. Test air flow.
   7. Duct static pressure.
   8. Air temperature.

G. Duct Leak Tests:
   1. Description of ductwork under test.
   2. Duct design operating pressure.
   3. Duct design test static pressure.
   4. Duct capacity, air flow.
   5. Maximum allowable leakage duct capacity times leak factor.
   6. Test apparatus:
      a. Blower.
      b. Orifice, tube size.
      c. Orifice size.
      d. Calibrated.
   7. Test static pressure.
   8. Test orifice differential pressure.
   9. Leakage.

H. Air Distribution Tests:
   1. Air terminal number.
   2. Room number/location.
   3. Terminal type.
   4. Terminal size.
   5. Area factor.
   6. Design velocity.
   7. Design air flow.
   8. Test (final) velocity.
   9. Test (final) air flow.
   10. Percent of design air flow.

END OF SECTION

SECTION 23 0713
DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

D. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.

E. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2011.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

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

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufinsulation.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation: www.ocbuildingspec.com.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   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.

E. Tie Wire: Annealed steel, 16 gage, 0.0508 inch diameter.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Knauf Insulation: www.knaufinsulation.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation; 700 Series FIBERGLAS Insulation: www.ocbuildingspec.com/sle.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 450 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent.
   4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   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

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 SCHEDULES

A. Exhaust Ducts Exposed to Outdoor Air:

B. Outside Air Intake Ducts:

C. Supply Ducts:

D. Return and Relief Ducts in Mechanical Rooms:

END OF SECTION

SECTION 23 0719
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 RELATED REQUIREMENTS

A. Section 23 2300 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

B. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2014.

C. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

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

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.

PART 3 EXECUTION

3.01 EXAMINATION

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

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

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.03 SCHEDULE

END OF SECTION

SECTION 23 2300
REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Valves.

E. Strainers.

F. Check valves.

G. Filter-driers.

H. Condensate piping

1.02 RELATED REQUIREMENTS

A. Section 22 0719 - Plumbing Piping Insulation.

B. Section 23 0719 - HVAC Piping Insulation.

C. Section 23 6213 - Packaged Air-Cooled Refrigerant Compressor and Condenser Units.

D. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.

B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.

C. ASHRAE Std 34 - Designation and Safety Classification of Refrigerants; 2013.

D. EPA 608 Refrigerant Certification - EPA regulations (40 CFR Part 82, Subpart F) under Section 608 of the Clean Air Act.

E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.

G. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.

H. ASME B31.9 - Building Services Piping; 2014.

I. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2013.

J. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

K. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.

M. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

1.04 SYSTEM DESCRIPTION

A. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

B. Filter-Driers:

1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

C. Sustainable Design Documentation: Submit manufacturer's product data on refrigerant used, showing compliance with specified requirements.

D. Submit certification of Refrigeration Technician: The technician responsible for the system refrigerant charging shall hold EPA Section 608 certification of the applicable level.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience. The technican responsible for refrigerant system charging shall hold EPA Section 608 certification of the applicable level.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Conform to ASME B31.9 for installation of piping system.

B. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.02 PIPING

A. Refrigerant Piping Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

B. Condensate Piping Cross Linked Polyethylene, PEX:
   1. PEX Pipe: ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
   2. Fittings: Compression Fittings as Specified by the Manufacturer.

C. Pipe Supports and Anchors:
   1. Provide hangers and supports that comply with MSS SP-58.
      a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
   3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
   4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
   5. Vertical Support: Steel riser clamp.
   6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
   7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
   8. 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.

2.03 REFRIGERANT

A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

2.04 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.05 VALVES

A. Service Valves:
   1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

2.06 STRAINERS

2.07 FILTER-DRIERS

A. Performance:
   1. Flow Capacity - Liquid Line: two ton, minimum, rated in accordance with AHRI 710.
   2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
   3. Design Working Pressure: 350 psi, minimum.

B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.

C. Construction: UL listed.
   1. Connections: As specified for applicable pipe type.

PART 3 EXECUTION

3.01 PREPARATION

A. Technician responsible for the system charging with refrigerant shall hold EPA Section 608 certification of the applicable level.

B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.

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

F. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.5.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.

G. Insulate piping and equipment; refer to Section and Section 22 0716.

H. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Test refrigeration system in accordance with ASME B31.5.

C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

3.04 SCHEDULES

A. Hanger Spacing for Copper Tubing.

1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.

END OF SECTION

SECTION 23 3100
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

1.02 RELATED REQUIREMENTS

A. Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.

B. Section 23 0713 - Duct Insulation: External insulation and duct liner.

C. Section 23 3700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2013.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2012.

F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2012.

G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2013.

H. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2013.

I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

K. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; 2012, 2nd Edition.

L. UL 181 - Standard for Factory-Made Air Ducts and Air Connectors; current edition, including all revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

C. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for 1 inch pressure class systems.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. pressure class, galvanized steel.

D. Return and Relief: 1/2 inch w.g. pressure class, galvanized steel.

E. General Exhaust: 1/2 inch w.g. pressure class, galvanized steel.

F. Outside Air Intake: 1/2 inch w.g. pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

C. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
   1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
   2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
   3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
   4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
   5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
   6. Other Types: As required.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
   1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
   2. Pressure Rating: 10 inches WG positive and 1.0 inches WG negative.
   3. Maximum Velocity: 4000 fpm.
   4. Temperature Range: Minus 10 degrees F to 160 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

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

END OF SECTION

SECTION 23 3300
AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Backdraft dampers - metal.

C. Duct access doors.

D. Duct test holes.

E. Flexible duct connections.

F. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 3100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 BACKDRAFT DAMPERS - METAL

A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch 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.

2.03 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

2.04 DUCT TEST HOLES

A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.05 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Flexible Duct Connections: Fabric crimped into metal edging strip.

2.06 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA (DCS) and as indicated.

B. Splitter Dampers:

C. Single Blade Dampers: Fabricate for duct sizes up to 6 by 30 inch.
   1. Fabricate for duct sizes up to 6 by 30 inch.
   2. Blade: 24 gage, 0.0239 inch, minimum.

D. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Blade: 18 gage, 0.0478 inch, minimum.

E. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

F. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 3100 for duct construction and pressure class.

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

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

D. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.

E. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

F. Use splitter dampers only where indicated.

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

END OF SECTION

SECTION 23 3423
POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cabinet exhaust fans.

B. Ceiling exhaust fans.

1.02 RELATED REQUIREMENTS

A. Section 23 3300 - Air Duct Accessories: Backdraft dampers.

1.03 REFERENCE STANDARDS

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; http://www.amca.org/certified/search/company.aspx.

B. AMCA 99 - Standards Handbook; 2010.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans; 2005.

D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

G. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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

C. Manufacturer's Instructions: Indicate installation instructions.

1.05 FIELD CONDITIONS

A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carnes, a division of Carnes Company Inc: www.carnes.com/sle.

B. Greenheck: www.greenheck.com.

C. Loren Cook Company: www.lorencook.com.

D. PennBarry: www.pennbarry.com.

E. Twin City Fan & Blower: www.tcf.com/sle.

2.02 POWER VENTILATORS - GENERAL

A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.

B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.

C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.

D. Fabrication: Conform to AMCA 99.

E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 CABINET AND CEILING EXHAUST FANS

A. Performance Ratings:
   1. As indicated on plans.
   2. Electrical Characteristics:
      a. 110 volts, single phase, 60 Hz.

B. Grille: Aluminum with baked white enamel finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 23 3700
AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Louvers.

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

B. Test and rate louver performance in accordance with AMCA 500-L.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. American Louver Company; ALC Grilles and Registers: www.americanlouver.com.

B. Carnes, a division of Carnes Company Inc: www.carnes.com.

C. Hart & Cooley, Inc: www.hartandcooley.com.

D. Krueger: www.krueger-hvac.com.

E. Price Industries: www.price-hvac.com.

F. Titus: www.titus-hvac.com.

G. Substitutions: See Section 01 6000 - Product Requirements.

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square and rectangular, adjustable pattern diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern.

B. Connections: Round.

2.03 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch margin with countersunk screw mounting.

C. Fabrication: Steel with 20 gage, 0.0359 inch minimum frames and 22 gage, 0.0299 inch minimum blades, steel and aluminum with 20 gage, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.

D. Color: To be selected by Engineer from manufacturer's standard range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

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

END OF SECTION

SECTION 23 8127

SMALL SPLIT-SYSTEM HEATING AND COOLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-source heat pumps.

B. Air cooled condensing units.

C. Indoor air handler (fan & coil) units for duct connection.

D. Indoor ductless fan & coil units.

E. Controls.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping : Includes indoor coil condensate drain.

B. Section 23 3100 - HVAC Ducts and Casings.

C. Section 26 2717 - Equipment Wiring: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008.

B. AHRI 270 - Sound Performance Rating of Outdoor Unitary Equipment; 2008.

C. AHRI 520 - Performance Rating of Positive Displacement Condensing Units; 2004.

D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.

E. ASHRAE Std 23.1 - Methods of Testing for Rating Positive Displacement Refrigerant Compressors and Condensing Units; 2010.

F. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.

G. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013, Including All Amendments and Errata.

H. ASHRAE Std 90.2 - Energy-Efficient Design of New Low-Rise Residential Buildings; 2007, Including All Addenda.

I. NEMA MG 1 - Motors and Generators; 2014.

J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

K. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2015.

L. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.

D. Design Data: Indicate refrigerant pipe sizing.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience and approved by manufacturer.

1.06 WARRANTY

A. Provide five year manufacturers warranty for heat exchangers and compressors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Carrier Corporation: www.carrier.com.

B. Trane Inc: www.trane.com.

C. York International Corporation / Johnson Controls: www.york.com.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.02 SYSTEM DESIGN

A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
   1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator; auxiliary electric heat.
   2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.

B. Performance Requirements: See Drawings for additional requirements.
   1. Efficiency:
      a. Comply with ASHRAE Std 90.1.

C. Electrical Characteristics:
   1. 240 volts, single phase, 60 Hz.
   2. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 26 2717.

2.03 INDOOR UNITS FOR DUCTED SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heating and cooling element(s), controls, and accessories; wired for single power connection with control transformer.
   1. Air Flow Configuration: Upflow.
   2. Cabinet: Steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.

B. Supply Fan: Centrifugal type rubber mounted with direct or belt drive with adjustable variable pitch motor pulley.
   1. Motor: NEMA MG 1; 1750 rpm single speed, permanently lubricated, hinge mounted.
   2. Motor Electrical Characteristics:

C. Air Filters: 1 inch thick glass fiber, disposable type arranged for easy replacement.

D. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturers: System manufacturer.

2.04 INDOOR UNITS FOR DUCTLESS SYSTEMS

A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
   1. Location: Ceiling.
   2. Sound Rating:
   3. Cabinet: Galvanized steel.
      a. Finish: White.
   4. Fan: Line-flow fan direct driven by a single motor.
   5. Filter return air with washable, antioxidant pre-filter and a pleated anti-allergy enzyme filter.

B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.
   1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
   2. Manufacturer: System manufacturer.

C. Remote Actuators:

2.05 OUTDOOR UNITS

A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
   1. Comply with AHRI 210/240.
   2. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
   3. Refrigerant: R-410A.
   4. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
   5. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
   6. Sound Rating: 69 dBA, when measured in accordance with AHRI 270.

B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.

C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
   1. Condenser Fans: Direct-drive propeller type.
   2. Condenser Fan Motor: Enclosed, 1-phase type, permanently lubricated.

D. Coil: Air-cooled, aluminum fins bonded to copper tubes.

E. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gage ports, thermometer well (in liquid line).
   1. Provide thermostatic expansion valves.
   2. Provide heat pump reversing valves.

F. Operating Controls:
   1. Control by room thermostat to maintain room temperature setting.
   2. Low Ambient Kit: Provide refrigerant pressure switch to cycle condenser fan on when condenser refrigerant pressure is above 285 psig and off when pressure drops below 140 psig for operation to 0 degrees F.

G. Mounting Pad: Precast concrete parking bumpers, minimum 4 inches square; minimum of two located under cabinet feet.

2.06 ACCESSORY EQUIPMENT

A. Room Thermostat: Wall-mounted, electric solid state microcomputer based room thermostat with remote sensor to maintain temperature setting; low-voltage; with following features:
   1. System selector switch (heat-off-cool) and fan control switch (auto-on).
   2. Automatic switching from heating to cooling.
   3. Preferential rate control to minimize overshoot and deviation from setpoint.
   4. Programming based on weekdays, Saturday and Sunday.
   5. Selection features including degree F or degree C display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
   6. Battery replacement without program loss.
   7. Thermostat Display:
      a. Time of day.
      b. Actual room temperature.
      c. Programmed temperature.
      d. System Mode Indication: Heating, Cooling, Fan Auto, Off, and On, Auto or On, Off.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.

B. Verify that proper power supply is available and in correct location.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.

B. Install in accordance with NFPA 90A and NFPA 90B.

C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Wire pulling lubricant.

E. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

B. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

C. Section 26 0801 - Electrical Testing and Inspections.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

F. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy; 2009.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

I. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

J. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

K. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Prior to energizing feeders, sub-feeders and service conductor cables shall be tested for electrical continuity and short circuits per Section 26 0801. A copy of these tests shall be sent to the engineer of record and the owner.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

H. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 50 feet: 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 90 feet: 8 AWG, for voltage drop.
   2. Control Circuits: 14 AWG.

J. Maximum Conductor Size: 500 kcmil.

K. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements or more than the maximum size requirements specified.

L. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:
      a. 208Y/120 V, 3 Phase, 4 Wire System:
         1) Phase A: Black.
         2) Phase B: Red.
         3) Phase C: Blue.
         4) Neutral/Grounded: White.
      b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Class B Stranded.

C. Insulation Voltage Rating: 600 V.

D. Insulation:
   1. Copper Building Wire: Type THHN/THWN or XHHW.

2.04 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Wiring Connectors for Splices and Taps:
   1. Solid Conductors.
      a. Joints in solid conductors shall be spliced using one of the following.
         1) Ideal "wirenuts".
         2) 3M Company "Scotchlock".
         3) Thomas & Betts connectors.
      b. All splices and taps shall be in one of the following.
         1) Junction boxes.
         2) Outlet boxes.
         3) Lighting fixtures.
   2. Stranded Conductors: shall be spliced by one of the following methods.
      a. Approved mechanical connectors and gum rubber tape or friction tape.
      b. Solderless mechanical connectors for splices and taps, provided with third party-approved insulating covers.

C. Permanent type crimp connectors shall not be used for branch circuit connections.

2.05 WIRING ACCESSORIES

A. Electrical Tape:

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage wire and cable has been completed.

B. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
   1. Unless dimensioned, circuit routing indicated is diagrammatic.
   2. When circuit destination is indicated and routing is not shown, determine exact routing required.

B. Install products in accordance with manufacturer's instructions.

C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.

D. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

G. Install conductors with a minimum of 12 inches of slack at each outlet.

H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

I. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

J. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in outlet or junction boxes, troughs and gutters. Do not pull splices into raceways or make splices in conduit bodies.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

K. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

L. Identify conductors and cables in accordance with Section 26 0553.

M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 0526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 0536 - Cable Trays for Electrical Systems: Additional grounding and bonding requirements for cable tray systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

B. Field quality control test reports.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer. Precipitation within the previous 48 hours does not constitute normally dry conditions.
2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
   a. Provide continuous grounding electrode conductors without splice or joint.
   b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
   a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet at an accessible location not more than 5 feet from the point of entrance to the building.
   b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
   c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Concrete-Encased Electrode:
   a. Provide connection to concrete-encased electrode consisting of not less than 20 feet of steel reinforcing bars embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
4. Ground Rod Electrode(s):
   a. Provide two electrodes unless otherwise indicated or required.
   b. Space electrodes not less than 6 feet from each other and any other ground electrode.
   c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
   a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
   b. Where ground bar location is not indicated, locate in accessible location as near as possible to service disconnect enclosure.
   c. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.

F. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
   a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
   b. Metal gas piping.
8. Bond the aboveground portion of the gas piping system upstream from equipment shutoff valve to the building electrical service ground. The bonding jumper shall be sized per NFPA 70, table 250-66.
9. Provide bonding for metal building frame where not used as a grounding electrode.
10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
11. Boxes with concentric, eccentric or over-sized knockouts shall be provided with bonding bushings and jumpers. The jumper shall be sized per NFPA 70, Table 250-122 and lugged to the box.

G. Communications Systems Grounding and Bonding:
   1. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
      a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
      b. Raceway Size: 3/4 inch unless otherwise indicated or required.
      c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:
   1. Description: Copper rectangular ground bars with mounting brackets and insulators.
   2. Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
   3. Holes for Connections: As indicated or as required for connections to be made.

E. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   2. Material: Copper-bonded (copper-clad) steel.
   3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as shown on the drawings.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

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

B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 0553.

3.03 FIELD QUALITY CONTROL

A. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

B. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

C. Submit detailed reports indicating inspection and testing results and corrective actions taken.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 0534 - Conduit: Additional support and attachment requirements for conduits.

B. Section 26 0537 - Boxes: Additional support and attachment requirements for boxes.

C. Section 26 5100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

D. Section 26 5600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

B. MFMA-4 - Metal Framing Standards Publication; 2004.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's catalog data for fastening systems.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
   a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
   b. Outdoor and Damp or Wet Indoor Locations: Use stainless steel or approved equivalent unless otherwise indicated.
   c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2.02 MATERIALS

A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.

B. Supports: Fabricated of structural steel or formed steel members; galvanized.

C. Anchors and Fasteners:
1. Do not use powder-actuated anchors.
2. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
3. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
6. Solid Masonry Walls: Use expansion anchors or preset inserts.
7. Sheet Metal: Use sheet metal screws.
8. Wood Elements: Use wood screws.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Engineer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Engineer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 26 0534
CONDUIT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 31 2316 - Excavation.

E. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC); 2005.

B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2015.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit; Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit; Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use rigid PVC conduit.
   2. Exterior, Embedded Within Concrete: Use rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to PVC-coated galvanized steel rigid metal conduit where emerging from underground.

D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

F. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

G. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.

H. Exposed, Exterior: Use PVC-coated galvanized steel rigid metal conduit.

I. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
   1. Maximum Length: 6 feet.

J. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.
      c. HVAC Equipment.

2.02 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 3/4 inch (21 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to luminaires or equipment: 1/2 inch (16 mm) trade size.
   5. Underground, Interior: 3/4 inch (21 mm) trade size.
   6. Underground, Exterior: 3/4 inch (21 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

E. Where concentric, eccentric or over-sized knockouts are encountered, a grounding-type insulated bushing shall be provided.

F. All conduits shall be provided with Insulated throat.

G. Where conduits of any type pass over a building expansion joint, a standard "expansion joint fitting," compatible with the type raceway being used, shall be provided.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:
   1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
      a. Do not use die cast zinc fittings.
   3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil.

C. PVC-Coated Fittings:
   1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
   2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
   3. Material: Use steel.
   4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil.

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil.

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
      a. Do not use die cast zinc fittings.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
      a. Do not use die cast zinc fittings.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:
   1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
   2. Material: Use steel.
      a. Do not use die cast zinc fittings.

3. Connectors and Couplings: Use compression (gland) type.
   a. Do not use indenter type connectors and couplings.
   b. Do not use set-screw type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; schedule 40 unless otherwise indicated; rated for use with conductors rated 90 degrees C.

B. Fittings:
   1. Manufacturer: Same as manufacturer of conduit to be connected.
   2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduits, juncition boxes, troughs and any enclosure mounted outside on the walls, shall be off the wall by one inch.

G. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated and routing is not shown, determine exact routing required.
   3. Arrange conduit to maintain adequate headroom, clearances, and access.
   4. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
   5. Arrange conduit to provide no more than 75 feet between pull points.
   6. Route conduits above water and drain piping where possible.
   7. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   8. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
   9. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
      a. Heaters.
      b. Hot water piping.
   10. Conduit provided below roof deck shall be installed 2 inches away from the deck to allow for screws not to penetrate the conduit during reroofing.

H. Conduit Support:
   1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

I. Connections and Terminations:
   1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
   2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
   3. Use suitable adapters where required to transition from one type of conduit to another.
   4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
   5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
   6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
   7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

J. Penetrations:
   1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
   2. Make penetrations perpendicular to surfaces unless otherwise indicated.
   3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
   4. Conceal bends for conduit risers emerging above ground.
   5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
   6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
   7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

K. Underground Installation:
   1. Provide trenching and backfilling in accordance with Section 31 2316 and Section 31 2323.
   2. Raceways run external to building foundation walls, with the exception of branch circuit raceways, shall be encased with a minimum of three (3) inches of concrete on all sides.
      a. Encased raceways must have a minimum cover of eighteen (18) inches, except for raceways containing circuits with voltages above 600 volts, which must have a minimum cover of thirty (30) inches
      b. Encased raceways shall be of a type approved by the NEC as "suitable for concrete encasement."
   3. Branch circuit raceways run underground external to building foundation walls shall be run in raceways installed in accordance with the NFPA 70, and shall be of a type approved by the NFPA 70 as "suitable for direct burial."
   4. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6 to 8 inches below finished grade. Tape shall be permanent, bright-colored, continuous printed, plastic tape compounded for direct burial not less than 6 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.
   5. Raceways run underground internal to building foundation walls shall be of a type and installed by a method approved by the NFPA 70.
   6. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the stub-up out of the slab or earth shall be of rigid steel.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
   1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
   2. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
   1. Where conduits pass from outdoors into conditioned interior spaces.
   2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

N. Provide grounding and bonding in accordance with Section 26 0526.

O. Identify conduits in accordance with Section 26 0553.

3.02 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

END OF SECTION

SECTION 26 0536
CABLE TRAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal cable tray systems:
   1. Metal wire mesh/basket cable tray.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

D. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NEMA FG 1 - Fiberglass Cable Tray Systems; 1993 (with Rev 1; 1994).

D. NEMA VE 1 - Metal Cable Tray Systems; 2009.

E. NEMA VE 2 - Cable Tray Installation Guidelines; 2013, with Errata 2016.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cable tray system components and accessories. Include dimensions, materials, fabrication details, finishes, and span/load ratings.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CABLE TRAY SYSTEM - GENERAL REQUIREMENTS

A. Provide new cable tray system consisting of all required components, fittings, supports, accessories, etc. as necessary for a complete system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Do not use cable tray for applications other than as permitted by NFPA 70 and product listing/classification.

D. Provide cable tray system and associated components suitable for use at indicated span/load ratings under the service conditions at the installed location.

E. Unless otherwise indicated, specified span/load ratings are according to NEMA VE 1 (metal cable tray systems) or NEMA FG 1 (fiberglass cable tray systems) with safety factor of 1.5 and working load only (no additional concentrated static load).

F. Unless otherwise indicated, specified load/fill depths and inside widths are nominal values according to NEMA VE 1 (metal cable tray systems) or NEMA FG 1 (fiberglass cable tray systems) with applicable allowable tolerances.

2.02 METAL CABLE TRAY SYSTEMS

A. Manufacturers:

1. Metal Cable Tray System:
   a. Chatsworth Products: www.chatsworth.com.
   b. Cablofil, a brand of Legrand North America, Inc: www.legrand.us/cablofil.
   c. Cope, a brand of Atkore International Inc: www.copecabletray.com.
   d. Thomas & Betts Corporation: www.tnb.com.
   e. Approved Equal.

B. Comply with NEMA VE 1.

C. Finishes:
   1. Zinc Electroplated Steel: Comply with ASTM B633.

D. Metal Wire Mesh/Basket Cable Tray:
   1. Material: Zinc electroplated steel.
   2. Tray Depth: As indicated on drawings.
   3. Span/Load Rating: As indicated on drawings.
   4. Mesh Spacing: 2 by 4 inches.
   5. Tray Width: As indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Install cable tray in accordance with NECA 1 (general workmanship), and NEMA VE 2.

C. Unless otherwise indicated, arrange cable tray to be parallel or perpendicular to building lines.

D. Arrange cable tray to provide required clearances and maintain cable access.

E. Install cable tray plumb and level, with sections aligned and with horizontal runs at the proper elevation.

F. Metal Wire Mesh/Basket Cable Tray: Field fabricate fittings in accordance with manufacturer's instructions, using only manufacturer-approved connectors classified for bonding.
   1. Inside Radius of Fittings: 12 inches.

G. Cable Tray Movement Provisions:
   1. Provide suitable expansion fittings where cable tray is subject to movement, including but not limited to:
      a. Where cable tray crosses structural joints intended for expansion.
      b. Long straight cable tray runs in accordance with NEMA VE 2.
   2. Use expansion guides in lieu of hold-down clamps where prescribed in NEMA VE 2.
   3. Set gaps for expansion fittings in accordance with NEMA VE 2.

H. Cable Provisions:
   1. Use suitable fixed barrier strips to maintain separation of cables as indicated and as required by NFPA 70.
   2. Use suitable drop-out fittings or bushings where cables exit cable tray as required to maintain minimum cable bending radius.
   3. Use suitable cable support fittings for long vertical cable tray runs with heavy cables.

I. Provide end closures at unconnected ends of cable tray runs.

J. Cable Tray Support:
   1. Use manufacturer's recommended hangers and supports, located in accordance with NEMA VE 2 and manufacturer's requirements, but not exceeding specified span unless otherwise approved by Engineer. Provide required support and attachment components in accordance with Section 26 0529, where not furnished by cable tray manufacturer.
   2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

K. Grounding and Bonding Requirements, in Addition to Requirements of Section 26 0526:
   1. Comply with grounding and bonding requirements of NEMA VE 2.

2. Metal Cable Tray Systems: Use suitable bonding jumpers or classified connectors to provide electrical continuity.

L. Penetrations: Install firestopping to preserve fire resistance rating of building elements, using materials and methods specified in Section 07 8400.

M. Identification Requirements, in Addition to Those Specified in Section 26 0553.

N. Install cable tray covers where indicated and as follows:

END OF SECTION

SECTION 26 0537
BOXES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Floor boxes.

1.02 RELATED REQUIREMENTS

A. Section 26 0529 - Hangers and Supports for Electrical Systems.

B. Section 26 2726 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2012.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels; Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes, junction and pull boxes, cabinets and enclosures, and floor boxes.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit or exposed intermediate metal conduit (IMC) is used.
   4. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
   5. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
   6. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
   7. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
   8. Minimum Box Size, Unless Otherwise Indicated:
      a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.
      b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
      c. Ceiling Outlets: 4 inch octagonal or square by 2-1/8 inch deep (100 by 54 mm) trade size.
   9. Wall Plates: Comply with Section 26 2726.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
   1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
   2. NEMA 250 Environment Type, Unless Otherwise Indicated:
      a. Indoor Clean, Dry Locations: Type 1, painted steel.
      b. Outdoor Locations: Type 3R, painted steel.
   3. Junction and Pull Boxes Larger Than 100 cubic inches:
      a. Provide hinged-cover enclosures unless otherwise indicated.

D. Floor Boxes:
   1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 2726; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.
   2. Use cast iron or nonmetallic floor boxes within slab on grade. Box utilized shall not require more than a 4" depth concrete pour consistent with depth of slab specified in structural design shown on plans.
   3. Conduit entries to box shall be side entries below slab.
   4. Metallic Floor Boxes: Fully adjustable (with integral means for leveling adjustment prior to and after concrete pour).
   5. Manufacturer: Same as manufacturer of floor box service fittings.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.

G. Nonmetallic Floor Boxes: Cut box flush with finished floor after concrete pour.

H. Provide grounding and bonding in accordance with Section 26 0526.

END OF SECTION

SECTION 26 0553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 0536 - Cable Trays for Electrical Systems: Additional identification requirements for cable tray systems.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace; 2015.

E. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Panelboards:
         1) Identify ampere rating.
         2) Identify voltage and phase.
         3) Identify power source and circuit number. Include location.
         4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
      b. Enclosed switches, circuit breakers, and motor controllers:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location.
         3) Identify load(s) served. Include location.
   2. Service Equipment:
      a. Use identification nameplate to identify each service disconnecting means.
   3. Use identification label or handwritten text using indelible marker on inside of door at each fused switch to identify required NEMA fuse class and size.
   4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by

NFPA 70, including but not limited to the following. Engineer will provide data to be included on label at time of submittal review.
    a. Service equipment.
    b. Panelboards.
5. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.
    a. Minimum Size: 3.5 by 5 inches.
    b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
2. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    a. At each source and load connection.
    b. Within boxes.
    c. Within equipment enclosures when conductors and cables enter or leave the enclosure.
3. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

C. Identification for Raceways:
1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 10 feet.
2. Usie identification labels to identify telecommunications system for accessible conduits at maximum intervals of 10 feet.
3. Use underground warning tape to identify underground raceways.

D. Identification for Boxes:
1. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Materials:
    a. Indoor Clean, Dry Locations: Use plastic nameplates.
    b. Outdoor Locations: Use stainless steel nameplates suitable for exterior use.
2. Plastic Nameplates: Two-layer or three-layer laminated electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
    a. Exception: Provide minimum thickness of 1/8 inch when any dimension is greater than 4 inches.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
4. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch by 2.5 inches.
2. Legend:
   a. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
   a. Equipment Designation: 1/2 inch.
   b. Other Information: 1/4 inch.
5. Color:
   a. Normal Power System:
      1) 208Y/120 V, 3 Phase Equipment: White text on blue background.
   b. Telephone System: White text on orange background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch by 2.5 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch.
5. Color: Black text on white background unless otherwise indicated.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches by 4 inches.
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch.
5. Color: Black text on yellow background unless otherwise indicated.

F. Format for Receptacle Identification:
1. Minimum Size: 3/8 inch by 1.5 inches.
2. Legend: Power source and circuit number or other designation indicated.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 3/16 inch.
5. Color: Black text on clear background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch.

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Minimum Size:
1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.

C. Legend:
1. Markers for Voltage Identification: Highest voltage present.

D. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:

2.06 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
      a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic signs.
      b. Outdoor Locations: Use factory pre-printed rigid aluminum signs.
   2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
   3. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Interior Components: Legible from the point of access.
   6. Conduits: Legible from the floor.
   7. Boxes: Outside face of cover.
   8. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Secure rigid signs using stainless steel screws.

H. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 0801
ELECTRICAL TESTING AND INSPECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Feeder Insulation Resistance Testing.

B. Ground System Testing.

C. Ground Fault Protection System Test.

D. Exit and Emergency Lighting Test.

E. Electrical Inspections.

1.02 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2014.

1.03 SUBMITTALS

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

B. All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.

PART 2 TESTING

2.01 FEEDER INSULATION RESISTANCE TESTING

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

1. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
2. After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. They shall then test each one separately to the panel and until the low readings are found. The contractor shall correct troubles, reconnect and retest until at least 250,000 ohms from neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
3. At final inspection, the contractor shall furnish a megger and show the engineers and State Construction Office representatives that the panels comply with the above requirements. They shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed by the representatives.

2.02 GROUND SYSTEM TESTING

A. Upon completion of the electrical grounding and bonding systems, the ground resistance shall be tested with a ground resistance tester. Where tests show resistance-to-ground is over 5 ohms, appropriate action should be taken to reduce the resistance to 5 ohms, or less, by driving additional ground rods. The compliance shall be demonstrated by retesting.

2.03 GROUND FAULT SYSTEM PROTECTIONS TESTING

A. All receptacles noted on plans as requiring ground fault protection shall be tested with a plug-in type GFCI tester.

2.04 EXIT AND EMERGENCY LIGHTING TESTING

A. Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes, in accordance with NFPA 70, Article 700. The battery test shall be done 10 days prior to final inspection by the State

Construction Office. Any unit which fails the test must be repaired or replaced, and tested again. Copy of the test report shall be retained within project record documentation.

PART 3 INSPECTIONS

3.01 INSPECTIONS BY AUTHORITY HAVING JURISDICTION

A. It shall be the responsibility of the electrical contractor to notify the State Electrical Inspector with Department of Administration; for state owned projects, and to notify the local inspectors; for community college & county owned buildings, to schedule required inspections.

B. Electrical contractor shall notify Stroud Engineering a minimum of 48 hours prior to any electrical inspection by the State Electrical Inspector or the local electrical inspector.

3.02 STROUD ENGINEERING INPECTIONS

A. It shall be the responsibility of the electrical contractor to schedule inspections by Stroud Engieering at the following times.

1. Prior to any underground or other concealed work being covered.
2. Day of electrical testing as described in this section.
3. Date of significant completion.

END OF SECTION

SECTION 26 0923
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 2726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
   1. Includes finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
   1. Hubbell Building Automation, Inc: www.hubbellautomation.com
   2. Lutron Electronics Company, Inc: www.lutron.com/sle.
   3. Sensor Switch Inc: www.sensorswitch.com.
   4. WattStopper: www.wattstopper.com.

B. All Occupancy Sensors:
   1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
   2. Sensor Technology:
      a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
   3. Provide LED to visually indicate motion detection.

4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval. Device shall be compatible with load controlled.
5. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
6. Sensitivity: Field adjustable.
7. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
c. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.

D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
b. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.
c. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
2. Passive Infrared (PIR) Wall Dimmer Occupancy Sensors: Capable of detecting motion within an area of 900 square feet.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.

G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

END OF SECTION

SECTION 26 2100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0553 - Identification for Electrical Systems: Identification products and requirements.

D. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 DEFINITIONS

A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

A. IEEE C2 - National Electrical Safety Code; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.

1.06 QUALITY ASSURANCE

A. Comply with the following:
   1. IEEE C2 (National Electrical Safety Code).
   2. NFPA 70 (National Electrical Code).
   3. The requirements of the Utility Company.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.

B. Electrical Service Characteristics: As indicated on drawings.

C. Utility Company: Duke Energy Progress.

D. Division of Responsibility:
   1. Pad-Mounted Utility Transformers:
      a. Transformer Vaults and Pads: Furnished and installed by Utility Company.
      b. Transformers: Furnished and installed by Utility Company.
      c. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
      d. Primary:
         1) Trenching and Backfilling: Provided by Utility Company.
         2) Conduits: Furnished and installed by Utility Company.
         3) Conductors: Furnished and installed by Utility Company.
      e. Secondary:

1) Trenching and Backfilling: Provided by Utility Company.
2) Conduits: Furnished and installed by Utility Company.
3) Conductors: Furnished and installed by Utility Company (Service Point at service entrance equipment).

2. Terminations at Service Point: Provided by Utility Company.
3. Metering Provisions:
   a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.

E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions and Utility Company requirements.

B. Perform work in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances and required maintenance access.

D. Provide required trenching and backfilling in accordance with Section 31 2316.13.

E. Provide required support and attachment components in accordance with Section 26 0529.

F. Provide grounding and bonding for service entrance equipment in accordance with Section 26 0526.

G. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 26 0553.

END OF SECTION

SECTION 26 2416
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA 407 - Standard for Installing and Maintaining Panelboards; 2009.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. NEMA PB 1 - Panelboards; 2011.

E. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

I. UL 67 - Panelboards; Current Edition, Including All Revisions.

J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. General Electric Company: www.geindustrial.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens Industry, Inc: www.usa.siemens.com.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet.
2. Ambient Temperature:

a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.

C. Short Circuit Current Rating:
1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.
1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
a. Indoor Clean, Dry Locations: Type 1.
b. Outdoor Locations: Type 3R.
2. Boxes: Galvanized steel unless otherwise indicated.
a. Provide wiring gutters sized to accommodate the conductors to be installed.
3. Fronts:
a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Load centers are not acceptable.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
1. Phase and Neutral Bus Material: Copper.
2. Ground Bus Material: Copper.

D. Circuit Breakers:
1. Provide bolt-on type.
2. Provide thermal magnetic circuit breakers unless otherwise indicated.

E. Enclosures:
1. Provide surface-mounted or flush-mounted enclosures as indicated.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:

1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
2. Interrupting Capacity:
   a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
   b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
3. Conductor Terminations:
   a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
6. Provide the following circuit breaker types where indicated:
   a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
7. Do not use tandem circuit breakers.
8. Do not use handle ties in lieu of multi-pole circuit breakers.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Install panelboards securely, in a neat and workmanlike manner in accordance with NECA 1 (general workmanship), NECA 407 (panelboards), and NEMA PB 1.1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 26 0529.

E. Install panelboards plumb.

F. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

G. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.

H. Provide minimum of six spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling.

I. Provide grounding and bonding in accordance with Section 26 0526.
   1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.

J. Install all field-installed branch devices, components, and accessories.

K. Provide filler plates to cover unused spaces in panelboards.

END OF SECTION

SECTION 26 2726
WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

D. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F, 1999.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (R 2010).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2012.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

I. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

K. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

C. Provide GFCI protection for receptacles installed within 6 feet of sinks.

D. Provide GFCI protection for receptacles installed in kitchens.

E. Provide GFCI protection for receptacles serving electric drinking fountains.

F. Unless noted otherwise, do not use combination switch/receptacle devices.

G. For flush floor service fittings, use tile rings for installations in tile floors.

H. For flush floor service fittings, use carpet flanges for installations in carpeted floors.

2.02 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

C. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

D. Flush Floor Box Service Fittings: Gray wiring devices with aluminum cover and ring/flange.

2.03 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

B. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.

C. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
   3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.05 WALL PLATES

A. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard.
   3. Screws: Metal with slotted heads finished to match wall plate finish.

B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

C. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

2.06 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
   1. Hubbell Incorporated: www.hubbell-wiring.com.
   2. Thomas & Betts Corporation: www.tnb.com.
   3. Wiremold, a brand of Legrand North America, Inc: www.legrand.us

B. Description: Service fittings compatible with floor boxes provided under Section 26 0537 with components, adapters, and trims required for complete installation.

C. Flush Floor Service Fittings:
   1. Single Service Flush Convenience Receptacles:
      a. Cover: Rectangular.
      b. Configuration: One standard convenience duplex receptacle(s) with duplex flap opening(s).
   2. Single Service Flush Communications Outlets:
      a. Cover: Rectangular.
      b. Configuration: One blank for future use..
      c. Voice and Data Jacks: Provided by others.
   3. Accessories:
      a. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

SECTION 26 2818
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 2813 - Fuses.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum); 2013.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

G. UL 98 - Enclosed and Dead-Front Switches; Current Edition, Including All Revisions.

H. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. General Electric Company: www.geindustrial.com.

C. Schneider Electric; Square D Products: www.schneider-electric.us.

D. Siemens Industry, Inc: www.usa.siemens.com.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet.
   2. Ambient Temperature: Between -22 degrees F and 104 degrees F.

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:

1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.
2. Minimum Ratings:
   a. Heavy Duty Single Throw Switches Protected by Class R Fuses: 200,000 rms symmetrical amperes.

G. Enclosed Safety Switches Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

H. Provide with switch blade contact position that is visible when the cover is open.

I. Fuse Clips for Fusible Switches: As required to accept fuses indicated.
   1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

J. Conductor Terminations: Suitable for use with the conductors to be installed.

K. Provide insulated, groundable fully rated solid neutral assembly where a neutral connection is required, with a suitable lug for terminating each neutral conductor.

L. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

M. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Indoor Clean, Dry Locations: Type 1.
      b. Outdoor Locations: Type 4X, 316 stainless steel.

N. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

O. Heavy Duty Switches:
   1. Comply with NEMA KS 1.
   2. Conductor Terminations:
      a. Provide mechanical lugs unless otherwise indicated.
      b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install enclosed switches in accordance with manufacturer's instructions.

B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required supports in accordance with Section 26 0529.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 0526.

H. Provide fuses complying with Section 26 2813 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

END OF SECTION

SECTION 26 4300
SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices for distribution locations.

B. Surge protective devices for branch panelboard locations.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 2416 - Panelboards.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.06 WARRANTY

A. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Field-installed, Externally Mounted Surge Protective Devices:
   1. Advanced Protection Technologies, Inc (APT): www.aptsurge.com.
   2. Current Technology; a brand of Thomas & Betts Power Solutions: www.tnbpowersolutions.com.
   3. General Electric Company: www.geindustrial.com.
   4. Schneider Electric; Square D Brand Surgelogic Products: www.surgelogic.com.

B. Factory-installed, Internally Mounted Surge Protective Devices:
   1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

C. UL 1449 Voltage Protection Ratings (VPRs):

1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.

D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

E. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
   1. Indoor clean, dry locations: Type 1.
   2. Outdoor locations: Type 4X.

F. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
   1. Panelboards: See Section 26 2416.

2.03 SURGE PROTECTIVE DEVICES FOR DISTRIBUTION LOCATIONS

A. Unless otherwise indicated, provide factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 or Type 2.

C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.

D. Surge Current Rating: Not less than 80 kA per mode/160 kA per phase.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.

G. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection status for each phase.
   2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

2.04 SURGE PROTECTIVE DEVICES FOR BRANCH PANELBOARD LOCATIONS

A. Unless otherwise indicated, provide factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 or Type 2.

C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.

D. Surge Current Rating: Not less than 60 kA per mode/120 kA per phase.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.

G. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection status.
   2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.

C. Verify system grounding and bonding is in accordance with Section 26 0526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1.

B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

C. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 0526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

END OF SECTION

SECTION 26 5100
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

1.02 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

B. Section 26 2726 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.

B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

F. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 101 - Life Safety Code; 2015.

I. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

J. UL 1598 - Luminaires; Current Edition, Including All Revisions.

K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
4. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and

ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

C. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

1.07 WARRANTY

A. Provide ten year full, manufacturer warranty for all LED luminaires, including drivers.

B. Provide three year full, manufacturer warranty for all exit and emergency lighting units.
   1. Provide additional two year pro-rated warranty for batteries for exit and emergency lighting units.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Recessed Luminaires:
   1. Ceiling Compatibility: Comply with NEMA LE 4.
   2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

H. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. Construction/Finish
      a. No visible welding, no plane-protruding screws, latches, springs, hooks, rivets or plastic supports viewed from the occupied (room) side are allowed.
   4. Maintenance
      a. Power supplies/drivers/ballasts, LED arrays, boards or light engines shall be easily field replaceable using common hand tools (e.g., screwdrivers, pliers, etc.) and without uninstalling the luminaire.
   5. Electrical Performance
      a. Operating voltage: universal (120, 240, 277 vac at 60 Hz).
      b. Power factor: = 0.90 (at full luminaire output and across specified voltage range).
      c. Total harmonic distortion: = 20% (at full luminaire output and across specified voltage range).
      d. Transient and surge protection: ANSI C62.41-2002 Category A surge protection standards up to and including 2.5 kV for interior fixtures.

e. Sound: Class A not to exceed a measured value of 24dB.
f. Maximum standby power: 1W.
g. LED arrays in the product(s) will be considered defective in material or workmanship if a total of 10% or more of the individual light-emitting diodes in the product(s) fail to illuminate during normal operation after installation.
h. Driver Robustness
   1) Driver efficiency (at full load): = 85% for drivers capable of = 50 watts and = 80% for drivers capable of < 50 watts.
   2) Federal Communications Commission (FCC) compliance: FCC 47 Part 15 Non-Consumer limits for EMI/RFI emissions.
i. Temperature Rating
   1) Each luminaire shall be designed to operate at an average operating temperature of 25°C.
   2) The operating temperature range shall be 0°C to 25°C.
j. Thermal management
   1) The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
   2) The LEDs manufacturer's maximum junction temperature for the expected life shall not be exceeded at the average operating ambient temperature.
   3) The LED manufacturer's maximum junction temperature for the catastrophic failure shall not be exceeded at the maximum operating ambient temperature.
   4) The driver manufacturer's maximum case temperature shall not be exceeded at the maximum operating temperature. Thermal management shall be passive by design. The use of fans or other mechanical cooling devices shall not be allowed.
k. EMI/RFI
   1) The luminaire and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC) Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI Emissions.

6. Colorimetric Performance
   a. Correlated Color Temperature (CCT): 3500K - 4000K.
   b. Acceptable tolerances as provided in ANSI C78.377-2015 (LED).
   c. Color Rendering Index (CRI) [Ra] = 80 with a positive R9 value.
   d. Color shift of no less than ?u'v' < 0.007 during the warranty period.

2.03 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
   1. It shall be sealed, maintenance free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of O degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive terminal and - negative terminal.

D. Charger:
   1. It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included if LEAD battery is used, to disconnect the

battery from the load and prevent damage from a deep discharge during extended power outage.

E. Additional Features:
   1. Pilot light to indicate the unit is connected to A.C power.
   2. The battery shall have high rate charge pilot light, unless self-diagnostic type.
   3. A test switch to simulate the operation of the unit upon loss of A.C power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

2.04 EXIT SIGNS

A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.

B. Self-Powered Exit Signs:
   1. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
   2. Battery:
      a. Shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of O degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive terminal and - negative terminal.
   3. Charger:
      a. Shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80 percent. A low voltage disconnect switch shall be included if LEAD Battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.
   4. Addition Features:
      a. Pilot light to indicate the unit is connected to AC power.
      b. The battery shall have high rate charge pilot light, unless self-diagnostic type.
      c. Tests switch to simulate the operation of the unit upon loss of A.C power by energizing the lamps from the battery. This simulation must also exercise the transfer relay.

2.05 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

B. Dimmable LED Drivers:
   1. Dimming Range: Continuous dimming from 100 percent to ten percent relative light output unless dimming capability to lower level is indicated, without flicker.
   2. Control Compatibility: Fully compatible with the dimming controls to be installed.
      a. Wall Dimmers: See Section 26 2726.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Emergency Lighting Units:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

I. Exit Signs:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

J. Install lamps in each luminaire.

3.02 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs and emergency lighting units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.03 ADJUSTING

A. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer or authority having jurisdiction.

B. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer or authority having jurisdiction.

3.04 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Engineer, and correct deficiencies or make adjustments as directed.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

1.02 RELATED REQUIREMENTS

A. Section 26 0537 - Boxes.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2010.

B. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.

B. Install products according to manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).

D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

E. Install accessories furnished with each luminaire.

F. Bond products and metal accessories to branch circuit equipment grounding conductor.

G. Install lamps in each luminaire.

END OF SECTION

SECTION 31 2200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal of topsoil.

B. Rough grading the site for site structures, building pads, and parking lots.

C. Finish grading .

1.02 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation.

B. Section 31 2316.13 - Trenching: Trenching and backfilling for utilities.

C. Section 31 2323 - Fill: Filling and compaction.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements relating to unit prices for this work.

1.04 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of North Carolina, Highway Department standards.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: See Section 31 2323.

B. Other Fill Materials: See Section 31 2323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

E. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

F. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.04 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site; remove remainder from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 8 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches.

E. Place topsoil in areas where seeding are indicated.

F. Place topsoil during dry weather.

G. Remove roots, weeds, rocks, and foreign material while spreading.

H. Near plants spread topsoil manually to prevent damage.

I. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

J. Lightly compact placed topsoil.

3.06 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.07 CLEANING

A. Remove unused stockpiled topsoil and subsoil. Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 31 2316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, site structures, utilities within the building, and Storm Water Detention Pond.

B. Trenching for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Grading.

B. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

C. Section 31 2323 - Fill: Fill materials, filling, and compacting.

D. Section 31 3700 - Riprap.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

1.04 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for excavation.

1.05 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Protect plants, lawns, rock outcroppings, and other features to remain.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Cut utility trenches wide enough to allow inspection of installed utilities.

F. Hand trim excavations. Remove loose matter.

G. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 31 2323.

H. Grade top perimeter of excavation to prevent surface water from draining into excavation.

I. Remove excavated material that is unsuitable for re-use from site.

J. Remove excess excavated material from site.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 PROTECTION

A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 2316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Site grading.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.05 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

C. Compaction Density Test Reports.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type 1: Imported borrow or on site subsoil complying with ASTM D 2487, Types SW, SP, SM, SC.

B. General Fill - Fill Type 2: Subsoil excavated on-site.

C. Structural Fill - Fill Type 3: Conforming to State of North Carolina Highway Department standard.

D. Sand - Fill Type 4: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.02 ACCESSORIES

A. Underground Warning Tape: Non-detectable polyethylene styles for metallic pipe or Detectable for nonmetallic pipe.

2.03 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

C. Locate, identify, and protect utilities that remain and protect from damage.

D. Notify utility company to remove and relocate utilities.

E. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Protect plants, lawns, rock outcroppings, and other features to remain.

3.03 TRENCHING

A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove excavated material that is unsuitable for re-use from site.

G. Remove excess excavated material from site.

3.04 PREPARATION FOR UTILITY PLACEMENT

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 BACKFILLING

A. Backfill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Underground piping, except lawn irrigaion lines shall have printed durable plastic warning tapes identifying buried piping below. Nonmetallic pipes (PE, PVC) shall be identified by magnetic type methods such as detectable tape or tracer wire.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

G. Correct areas that are over-excavated.

1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

H. Compaction Density Unless Otherwise Specified or Indicated:

I. Reshape and re-compact fills subjected to vehicular traffic.

3.06 BEDDING AND FILL AT SPECIFIC LOCATIONS

3.07 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180, or ASTM D698 ("standard Proctor").

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: _____.

3.08 CLEANING

A. Leave unused materials in a neat, compact stockpile.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 2323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for paving and site structures.

B. Backfilling and compacting for utilities outside the building to utility main connections.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Site grading.

B. Section 31 2316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

1.04 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

1.05 REFERENCE STANDARDS

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

C. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

1.06 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Compaction Density Test Reports.

1.07 QUALITY ASSURANCE

A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.08 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where indicated.
   1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
   2. Prevent contamination.
   3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type 1: Imported borrow or on site subsoil complying with ASTM D 2487, Types SW, SP, SM, SC.

B. General Fill - Fill Type 2: Subsoil excavated on-site.

C. Structural Fill - Fill Type 3: Conforming to State of North Carolina Highway Department standard.

D. Sand - Fill Type 4: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.

2.02 SOURCE QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Identify required lines, levels, contours, and datum locations.

B. See Section 31 2200 for additional requirements.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Employ a placement method that does not disturb or damage other work.

C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

D. Maintain optimum moisture content of fill materials to attain required compaction density.

E. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

F. Correct areas that are over-excavated.
   1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

G. Compaction Density Unless Otherwise Specified or Indicated:
   1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.

H. Reshape and re-compact fills subjected to vehicular traffic.

3.04 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Backfill for Undercut Areas: Sand Type 4.

C. Structure Foundation: Structural Fill, Type 3.

D. Concrete Slab Subgrade: Genearl Fill, Type 2 or Sand Type 4, must be approved by the Engineer.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: _____.

3.07 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 31 3116
TERMITE CONTROL

PART 1 - GENERAL

1.1 DEFINITIONS:
As follows:
A. EPA: U.S. Environmental Protection Agency.
B. PCO: Pest control operator.

1.2 SUBMITTALS:
Treatments and application instructions, including EPA-Registered Label, special warranties, and the following:
A. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.
6. Areas of application.
7. Water source for application.
B. Project Date: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
C. Test Reports: Indicate regulatory agency approval reports when required.
D. Manufacturer's Application Instructions: Indicate caution requirements.
E. Manufacturer's Certificate; Certify that toxicants meet or exceed specified requirements.
F. Record moisture content of soil before applications.
G. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.
H. See Section 01 3000 – Administrative Requirement, for submittal procedures.

1.3 APPLICATOR QUALIFICATIONS:
A PCO who is licensed in the State of North Carolina to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

1.4 REGULATORY REQUIREMENTS:
Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and the NC Department of Agriculture and Consumer Services, Structural Pest Control Division.

1.5 Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.6 GENERAL WARRANTY:
Special warranty specified 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.

1.7 SPECIAL WARRANTY:
Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites for five (5) years from date of Substantial Completion. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

PART 2 - PRODUCTS

2.1 TOXICANT CHEMICALS:

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

B. EPA approved; synthetically color dyed to permit visual identification of treated soil.

PART 3 - EXECUTION

3.1 Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

A. Slabs-on-grade.

B. Foundations.

C. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

3.2 Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

3.3 Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

3.4 Post warning signs in areas of application.

3.5 Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 31 3116

SECTION 31 3700
RIPRAP

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Riprap .

1.02 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with State of North Carolina Highways standard.

PART 2 PRODUCTS

2.01 MATERIALS

A. Riprap: Broken stone, 6 inch minimum size, 12 inch maximum size; solid and nonfriable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not place riprap bags over frozen or spongy subgrade surfaces.

3.02 PLACEMENT

A. Place riprap at culvert pipe ends, embankment slopes, and as indicated.

END OF SECTION

SECTION 32 1123
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for base course.

B. Section 31 2316.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 32 1216 - Asphalt Paving: Finish and binder asphalt courses.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for general requirements applicable to unit prices for earthwork.

B. Coarse Aggregate Type ____: By the cubic yard. Includes supplying aggregate material, stockpiling, scarifying substrate surface, placing, and compacting.

1.04 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses; 1965 (2012).

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; 2010.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.

H. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2010.

I. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth); 2010.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

C. Compaction Density Test Reports.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate Type A: Coarse aggregate, conforming to State of North Carolina Highway Department standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Place aggregate in maximum 4 inch layers and roller compact to specified density.

B. Level and contour surfaces to elevations and gradients indicated.

C. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

D. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

E. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: _____.

F. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.

END OF SECTION

SECTION 32 1216
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single course bituminous concrete paving.

B. Double course bituminous concrete paving.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Preparation of site for paving and base.

B. Section 31 2323 - Fill: Compacted subgrade for paving.

C. Section 32 1123 - Aggregate Base Courses: Aggregate base course.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices for requirements applicable to this section. Measurement and payment will be as follows:

1.04 REFERENCE STANDARDS

A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types; 1997.

B. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction; 2009a.

C. NCDOT Standard Specifications for Roads and Structures, latest edition

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of North Carolina Highways standard.

B. Mixing Plant: Conform to State of North Carolina Highways standard.

C. Obtain materials from same source throughout.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: ASTM D946.

B. Aggregate for Base Course: In accordance with State of North Carolina Highways standards.

C. Aggregate for Wearing Course: In accordance with State of North Carolina Highways standards.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

A. Wearing Course: Type SF 9.5A State of North Carolina Highways standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 PLACING ASPHALT PAVEMENT - SINGLE COURSE

A. Install Work in accordance with State of North Carolina Highways standards.

B. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

C. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

3.03 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Compacted Thickness: Within 1/4 inch of specified or indicated thickness.

C. Variation from True Elevation: Within 1/2 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for quality control.

B. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.

END OF SECTION

SECTION 32 1723.13
PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols, and curb markings.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

1.03 REFERENCE STANDARDS

A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

B. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

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.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; color(s) as indicated.
   1. Parking Lots: Yellow.
   2. Handicapped Symbols: Blue.

B. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as to perform satisfactorily during period for which its use is required.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.

C. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

D. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.

E. Temporary Pavement Markings: When required or directed by Engineer, apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
   1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
   2. At Contractor's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner.

3.02 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
   1. Apply paint in one coat only.
   2. Wet Film Thickness: 0.015 inch, minimum.
   3. Width Tolerance: Plus or minus 1/8 inch.

G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
   1. Mark the International Handicapped Symbol at indicated parking spaces.
   2. Hand application by pneumatic spray is acceptable.

H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.03 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner.

END OF SECTION

SECTION 32 9219
SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Seeding, mulching and fertilizer.

D. Maintenance.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Topsoil material.

B. Section 31 2200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

C. Section 31 2323 - Fill: Topsoil material.

1.03 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.04 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.05 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.07 MAINTENANCE SERVICE

A. Furnish maintenance of seeded areas for three months from Date of final acceptance.

B. Maintain seded areas immediattely after plaement until grass is well established and exhibits a vigorous growing condition.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Seed Mixture: All rates are in pounds per acre.
   1. March 1-August 31
      a. 18 lbs. Creeping Red Fescue
      b. 6 lbs. Indiangrass
      c. 8 lbs. Little Bluestem
      d. 4 lbs. Switchgrass
      e. 25 lbs. Browntop Millet
      f. 500 lbs. Fertilizer
      g. 4000 lbs. Limestone
   2. Semptember 1 - February 28

a. 18 lbs. Creeping Red Fescue
b. 6 lbs. Indiangrass
c. 8 lbs. Little Bluestem
d. 4 lbs. Switchgrass
e. 35 lbs. Rye Grain
f. 500 lbs. Fertilizer
g. 4000 lbs. Limestone

2.02 SOIL MATERIALS

A. Respread from stockpile.

2.03 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

B. Fertilizer: recommended for grass, with fifty percent of the elements derived from orgainc sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION

A. Prepare subgrade in accordance with Section 31 2200.

B. Place topsoil in accordance with Section 31 2200.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.04 SEEDING

A. Apply seed evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or during windy periods.

D. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

E. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

F. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate of ____ lbs per 1000 sq ft evenly in two intersecting directions.

B. Do not hydroseed area in excess of that which can be mulched on same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.06 MAINTENANCE

A. Water to prevent grass and soil from drying out.

B. Roll surface to remove minor depressions or irregularities.

C. Immediately reseed areas that show bare spots.

END OF SECTION

SECTION 32 9223
SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Fertilizing.

D. Sod installation.

1.02 RELATED REQUIREMENTS

A. Section 31 2200 - Grading: Topsoil material.

B. Section 31 2200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.

1.03 PRICE AND PAYMENT PROCEDURES

A. Topsoil:
   1. Basis of Measurement: By the cubic yard.
   2. Basis of Payment: Includes topsoil, placing topsoil.

B. Sodded Areas:
   1. Basis of Measurement: By the square yard.
   2. Basis of Payment: Includes preparation of subsoil, placing topsoil, sodding, watering and maintenance to specified time limit.

1.04 DEFINITIONS

A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.05 REFERENCE STANDARDS

A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding; 2006.

1.06 QUALITY ASSURANCE

A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of North Carolina.

B. Installer Qualifications: Company approved by the sod producer.

1.07 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver sod on pallets. Protect exposed roots from dehydration.

B. Do not deliver more sod than can be laid within 24 hours.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: TPI (SPEC), Certified Turfgrass Sod quality; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft. Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.

B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION

A. Prepare subgrade in accordance with Section 31 2200.

B. Place topsoil in accordance with Section 31 2200.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions.

B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.04 LAYING SOD

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod immediately after delivery to site to prevent deterioration.

C. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

D. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1/2 inch below top of hard surface.

E. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.

F. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

3.05 MAINTENANCE

A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

B. Neatly trim edges and hand clip where necessary.

C. Water to prevent grass and soil from drying out.

END OF SECTION

SECTION 33 1116
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 DESCRIPTION

A. This section gives the reqirements for installation of water lines, including pipe, valves, and service connections and sampling stations. Excavation, trenching and backfilling are covered in different sections of the specifications.

B. The forman of the contracting crew must speak fluent English.

C. Any event requiring a Cape Fear Public Utility Authority (CFPUA) representative to be present will require a 2 working day notice to schedule the event.

D. No valves are to be operated unless a CFPUA representative is present. Any valves operated without a CFPUA representative present or a directive may be subject to penalties in accordance with CFPUA's Ordinance.

1.02 SUBMITTALS

A. Shop Drawings: Contractor shall furnish to CFPUA Engineering shop drawings and material specification sheets of all material and items to be installed or delivered.

PART 2 PRODUCTS

2.01 PIPE

A. GENERAL: Water main and service shall be constructed of PVC pipe except when ductile iron is required. Water service laterlas shall be constructed of CTS PE Tubing.

B. Service LIne Piping:Pipe shall be polyethylene (PE) tubing, SDR 9, 200 psi, conforming to ASTM D2737/AWWA C901. No joint shall be installed between the main service tap and the meter stop. In proven contaminated soil conditions, copper (Type K) services may be required at the discretion of CFPUA.

2.02 SERVICE LINE ITEMS

A. SERVICE TAPS - 2 INCH: Saddles for PVC mains shall be wide band, 2 pieces, brass body (McDonald 3801 Series) Ford S90 (double strap) or bronze body (Mueller Series H-13000). No three piece service saddles are permitted.

B. TAPPING SLEEVE/VALVE: The tapping valve shall be a 3-inch, Resilient Wedge Gate Valve, AFC 2505 SS or approved equal.

C. VALVE BOXES: A valve box as specified in the specifications shall be installed with the 2-inch tapping valve and larger.

2.03 SINGLE SERVICE LINE

A. COMPRESSION ADAPTER FITTINGS: Service stops shall have compression adapter fitting for connection to 1-inch diameter (minimum) PE water service line and shall be McDonald Model 4753 - 22 or approved equal Stainless steel insert stiffeners, 1-inch diamter, McDonald Part Number 6133T or approved equal shall be used on all compression fittings.

B. SERVICE ANGLE STOPS: Service stop shall have threaded fitting for connection to compression adapter and shall be McDonald Model 4642B, or approved equal.

2.04 WATER METER BOXES

A. Boxes shall be cast iron or plastic with cover complete with lifting lug and a metal read lid. Water meter boxes are to be a minimum of five (5) feet from the property corner.

B. Single meter box shall be Carson 1015-12 Black Meter Box with 2/6 MSHI F with cast iron reader or approved equal.

C. Large meter boxes for 1-1/2" or 2" meters shall be Sigma MB 2203 large cast iron boxes (minimum 26-3/4" x 6-3/4")

2.05 PIPE LOCATION WIRE:

A. Pipe locator wire shall be installed on all main lines, hydrant legs and services as per speifications. A 10 gauge insulated copper wire rated for underground waterproof application. All splices in the wire shall be made with 3M DBR Direct Bury Splice Kit an underground rated, watertight, and approved splice connector or approved equal.

2.06 JOINTING OF PIPE

A. SERVICE LATERALS: Service laterlas shall consist of a tapping saddle, corporation stop and a length of PE pipe with no joint installed between the main service tap and the service stop. Service laterals shall be installed perpendicular to the water main. Contractor shall install all material per the detail allowing for meter installation at a later date by CFPUA personnel. Locator wire shall be installed as per speicifications.

1. PVC Pipe: ASTM D1785, Schedule 40.
   a. Fittings: ASTM D2466, PVC.
   b. Joints: ASTM D2855, solvent weld.
2. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.07 VALVES

A. Valves: Manufacturer's name and pressure rating marked on valve body.

B. Gate Valves Up To 3 Inches:

1. Brass or Bronze body, non-rising stem, inside screw, single wedge or disc, compression ends, with control rod, and extension box.

C. Ball Valves Up To 2 Inches:

1. Brass body, Teflon coated brass ball, rubber seats and stem seals, Tee stem pre-drilled for control rod, AWWA inlet end, compression outlet with electrical ground connector, with control rod and extension box.

2.08 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2316.13.

B. Cover: As specified in Section 31 2316.13.

2.09 ACCESSORIES

A. Backflow Preventer: _____.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 TRENCHING

A. See the sections on excavation and fill for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.03 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Slope water pipe and position drains at low points.

D. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.04 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

END OF SECTION

SECTION 33 1300
DISINFECTING OF WATER UTILITY DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 1116.

1.02 RELATED REQUIREMENTS

A. Section 22 1005 - Plumbing Piping: Disinfection of building domestic water piping system.

B. Section 33 1116 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

A. AWWA B300 - Hypochlorites; 2011.

B. AWWA C651 - Disinfecting Water Mains; 2005.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Test Reports: Indicate results comparative to specified requirements.

C. Certificate: From authority having jurisdiction indicating approval of water system.

D. Disinfection report:
   1. Type and form of disinfectant used.
   2. Date and time of disinfectant injection start and time of completion.
   3. Test locations.
   4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
   5. Date and time of flushing start and completion.
   6. Disinfectant residual after flushing in ppm for each outlet tested.

E. Bacteriological report:
   1. Date issued, project name, and testing laboratory name, address, and telephone number.
   2. Time and date of water sample collection.
   3. Name of person collecting samples.
   4. Test locations.
   5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
   6. Coliform bacteria test results for each outlet tested.
   7. Certification that water conforms, or fails to conform, to bacterial standards of _____.

1.05 QUALITY ASSURANCE

A. Submit bacteriologist's signature and authority associated with testing.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

A. Chemicals: AWWA B300, Hypochlorite.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping system and water well has been cleaned, inspected, and pressure tested.

B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.

B. Provide and attach equipment required to perform the work.

C. Inject treatment disinfectant into piping system.

D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 3111

SITE SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary drainage system to municipal sewers.

1.02 RELATED REQUIREMENTS

A. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

1.03 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015.

B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications; 2014.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of ____ inches, bell and spigot style solvent sealed joint end.

B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 PIPE ACCESSORIES

A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 31 2316.13 for additional requirements.

B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D2321.

B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

C. Connect to building sanitary sewer outlet and municipal sewer system, through installed sleeves.

D. Install trace wire 6 inches above top of pipe; coordinate with Section 31 2316.13.

3.03 INSTALLATION - CLEANOUTS

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing in accordance with Section 01 4000.

END OF SECTION

SECTION 33 4111
SITE STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Storm drainage piping, fittings, and accessories.

B. Connection of drainage system to municipal sewers.

1.02 RELATED REQUIREMENTS

A. Section 31 2316 - Excavation: Excavating of trenches.

B. Section 31 2316.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 31 2323 - Fill: Bedding and backfilling.

1.03 REFERENCE STANDARDS

A. ASTM A48/A48M - Standard Specification for Gray Iron Castings; 2003 (Reapproved 2012).

B. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2015.

C. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric); 2014.

D. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2012.

E. ASTM C443M - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric); 2011.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Concrete Pipe: Reinforced, ASTM C76 (ASTM C76M), Class II with Wall type A; mesh reinforcement; inside nominal diameter of ____ inches, bell and spigot end joints.

B. Reinforced Concrete Pipe Joint Device: ASTM C443 (ASTM C443M) rubber compression gasket joint.

2.02 CATCH BASIN, DROP INLETS & JUNCTION BOXES

A. Lids and Drain Covers: Cast iron, hinged to cast iron frame.
   1. Catch Basin: Basic Materials: NCDOT Section 840-2
   2. Catch Basin Grate, Frame and Hood
      a. U.S. Foundry-USF 5181-6421
      b. Approved Equal
   3. Drop Inlet Grate and Frame
      a. Standard: U.S. Foundry-USF 4137-6238
   4. Low Profile: U.S. Foundry-USF 4130-6230

2.03 BEDDING AND COVER MATERIALS

A. Bedding: As specified in Section 31 2323.

PART 3 EXECUTION

3.01 TRENCHING

A. See Section 31 2316.13 - Trenching for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.02 INSTALLATION - PIPE

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

3.03 INSTALLATION - CATCH BASINS, DROP INLETS & JUNCTION BOXES

A. Follow procedures of NCDOT-Section 840-3
   1. Form bottom of excavation clean and smooth to correct elevation.
   2. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
   3. Establish elevations and pipe inverts for inlets and outlets as indicated.
   4. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.04 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

FORM OF PROPOSAL

NCDOT Division III
Multi-Unit Office Building
(Castle Hayne)
Project No. 15-12499-02A

Contract:_____
Bidder: _____
Date:_____

The undersigned, as bidder, hereby declares that the only person or persons interested in this proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The bidder further declares that he has examined the site of the work and the contract documents relative thereto, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with the State of North Carolina in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of NCDOT Division III Multi-Unit Office Building (Castle Hayne) located in Castle Hayne, North Carolina in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina and Burnette • Chalk Architecture & Planning, P.A. with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

SINGLE PRIME CONTRACT:_____

Base Bid:

_____Dollars($)_____

General Subcontractor:

_____Lic_____

Plumbing Subcontractor:

_____Lic_____

Mechanical Subcontractor:

_____Lic_____

Electrical Subcontractor:

_____Lic_____

GS143-128(d) requires all single prime bidders to identify their subcontractors for the above subdivisions of work. A contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except (i) if the listed subcontractor's bid is later determined by the contractor to be non-responsible or non-responsive or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work, or (ii) with the approval of the awarding authority for good cause shown by the contractor.

GENERAL CONTRACT:
UNIT PRICES

Unit prices quoted and accepted shall apply throughout the life of the contract, except as otherwise specifically noted. Unit prices shall be applied, as appropriate, to compute the total value of changes in the base bid quantity of the work all in accordance with the contract documents.

GENERAL CONTRACT:

A. Earthwork: Unsuitable soils $_____/cy

1. Excavation and disposal of unsatisfactory soil materials and replacements with compacted satisfactory soil materials from off-site sources, on a cubic yard in place cost basis. Base bid shall include all grading shown in the construction documents. This Unit price shall be utilized only if unforeseen conditions arise.

B. Earthwork: Additional soils: $_____/cy

1. Additional soils (Fill material) in place, installed, graded, and compacted on a cubic yard basis. Fill material shall be as indicated in Section 31-2323. This unit price shall be utilized if additional soil is requested by the owner.

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within the time specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS

Provide with the bid - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.
NOTE: A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of Affidavit (**A**) required above. The MB Participation Form must still be submitted even if there is zero participation.

After the bid opening **- The Owner will consider all bids and alternates and determine the lowest responsible,** responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

*** OR ***

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

Note: Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero on the form. Affidavit A **or** Affidavit B, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

Proposal Signature Page

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bonds within ten (10) consecutive calendar days after being given written notice of the award of contract, the certified check, cash or bid bond accompanying this bid shall be paid into the funds of the owner's account set aside for the project, as liquidated damages for such failure; otherwise the certified check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Respectfully submitted this day of _____

_____
(Name of firm or corporation making bid)

WITNESS:

_____
(Proprietorship or Partnership)

By:_____
Signature

Name: _____
Print or type

Title_____
(Owner/Partner/Pres./V.Pres)

Address_____

_____

ATTEST:

By:_____

Title:_____
(Corp. Sec. or Asst. Sec. only)

License No._____

Federal I.D. No. _____

Email Address: _____

(CORPORATE SEAL)

Addendum received and used in computing bid:

Addendum No. 1 _____ Addendum No. 3 _____ Addendum No. 5_____ Addendum No. 6_____

Addendum No. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____ Addendum No. 7 _____

Identification of HUB Certified/ Minority Business Participation

I,_____,
(Name of Bidder)
do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work Type	*Minority Category	**HUB Certified (Y/N)

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

The total value of minority business contracting will be ($)_____.

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

County of _____

(Name of Bidder)

Affidavit of_____

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

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

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

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

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

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of_____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

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

County of _____

Affidavit of _____
(Name of Bidder)

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

_____ contract.
(Name of Project)

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

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

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

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____

SEAL

State of _____, County of _____

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

Notary Public _____

My commission expires _____

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

State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.
This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date:_____ Name of Authorized Officer:_____

Signature:_____

SEAL

Title:_____

State of _____, County of _____
Subscribed and sworn to before me this _____day of _____20____
Notary Public_____
My commission expires_____

State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____
(Project Name)

Project ID#_____ Amount of Bid $_____

I will expend a minimum of _____% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**** HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.

B. Copies of quotes or responses received from each firm responding to the solicitation.

C. A telephone log of follow-up calls to each firm sent a solicitation.

D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.

E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.

F. Copy of pre-bid roster

G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.

H. Letter detailing reasons for rejection of minority business due to lack of qualification.

I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date:_____ Name of Authorized Officer:_____

Signature:_____

Title:_____

SEAL

State of_____, County of _____

Subscribed and sworn to before me this _____day of _____20____

Notary Public_____

My commission expires _____

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS THAT _____ _____ as principal, and _____, as surety, who is duly licensed to act as surety in North Carolina, are held and firmly bound unto the State of North Carolina* through _____ as obligee, in the penal sum of _____ DOLLARS, lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated this ____ day of _____ 20__

WHEREAS, the said principal is herewith submitting proposal for and the principal desires to file this bid bond in lieu of making the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that if the principal shall be awarded the contract for which the bid is submitted and shall execute the contract and give bond for the faithful performance thereof within ten days after the award of same to the principal, then this obligation shall be null and void; but if the principal fails to so execute such contract and give performance bond as required by G.S. 143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by G.S. 143-129.1

_____(SEAL)

_____(SEAL)

_____(SEAL)

_____(SEAL)

_____(SEAL)

FORM OF CONSTRUCTION CONTRACT

(ALL PRIME CONTRACTS)

THIS AGREEMENT, made the _____ day of _____ in the year of 20__ by and between _____

_____

hereinafter called the Party of the First Part and the State of North Carolina, through the North Carolina Department of Transportation hereinafter called the Party of the Second Part.

WITNESSETH:

That the Party of the First Part and the Party of the Second Part for the consideration herein named agree as follows:

1. Scope of Work: The Party of the First Part shall furnish and deliver all of the materials, and perform all of the work in the manner and form as provided by the following enumerated plans, specifications and documents, which are attached hereto and made a part thereof as if fully contained herein: advertisement; Instructions to Bidders; General Conditions; Supplementary General Conditions; specifications; accepted proposal; contract; performance bond; payment bond; power of attorney; workmen's compensation; public liability; property damage and builder's risk insurance certificates; approval of attorney general; certificate by the Office of State Budget and Management, and drawings, titled:

NCDOT Division III Multi-Unit Office Building (Castle Hayne)

Consisting of the following sheets: _____

Sheet No.	Contents
T1.0	Cover Sheet
T2.0	Building Code Summary: Appendix B
T2.1	Life Safety Plan
1 of 1	Existing Conditions Survey
C1 of 6	Site Plan
C2 of 6	Grading Plan
C3 of 6	Waters of the US Impact Map
C4 of 6	Utility Plan
C5 of 6	Vegetation Plan
C6 of 6	Details
SSD-2	CFPUA Sanitary Sewer
WSD-1	CFPUA Water Distribution System
A1.1	Floor Plan
A1.2	Reflected Ceiling Plan
A1.3	Roof Plan
A2.1	Exterior Elevations
A3.1	Building Sections
A3.2	Building Sections
A3.3	Wall Sections
A4.1	Door & Window Schedules & Details
A4.2	Room Finish Schedule/Interior Elevations

A4.3	Details
S1	Foundation Plan & Details
S2	Framing Plan & Framing Details
S3	Details & General Notes
P1 of 4	Plumbing Cover
P2 of 4	Plumbing DWV and Water Plan
P3 of 4	Plumbing Schedules & Details
P4 of 4	Plumbing Natural Gas Plan & Isometric
M1 of 4	Mechanical Cover
M2 of 4	Mechanical Plan
M3 of 4	Mechanical Enlarged Plan & Sections
M4 of 4	Mechanical Details, Schedules, & Sequence of Operation
E1 of 7	Site Electrical & Lighting Plan & Riser
E2 of 7	Electrical Plan
E3 of 7	Communications & Security Plan
E4 of 7	Lighting Plan
E5 of 7	Electrical Schedules
E6 of 7	Panel Schedules
E7 of 7	Electrical Details

_____

_____

_____

Dated: _____ and the following addenda:

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

Addendum No _____ Dated: _____ Addendum No. _____ Dated: _____

2. That the Party of the First Part shall commence work to be performed under this agreement on a date to be specified in a written order of the Party of the Second Part and shall fully complete all work hereunder within _____ consecutive calendar days from said date. For each day in excess thereof, liquidated damages shall be as stated in Supplementary General Conditions. The Party of the First Part, as one of the considerations for the awarding of this contract, shall furnish to the Party of the Second Part a construction schedule setting forth planned progress of the project broken down by the various divisions or part of the work and by calendar days as outlines in Article 14 of the General Conditions of the Contract.

3. The Party of the Second Part hereby agrees to pay to the Party of the First Part for the faithful performance of this agreement, subject to additions and deductions as provided in the specifications or proposal, in lawful money of the United States as follows:

_____

_____ ($).

4. In accordance with Article 31 and Article 32 of the General Conditions of the Contract, the Party of the Second Part shall review, and if approved, process the Party of the First Party's pay request within 30 days upon receipt from the Designer. The Party of the Second Part, after reviewing and approving said pay request, shall make payments to the Party of the First Part on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the First Party, less five percent (5%) of the amount of such estimate which is to be retained by the Second Party until all work has been performed strictly in accordance with this agreement and until such work has been accepted by the Second Party. The Second Party may elect to waive retainage requirements after 50 percent of the work has been satisfactorily completed on schedule as referred to in Article 31 of the General Conditions.

5. Upon submission by the First Party of evidence satisfactory to the Second Party that all payrolls, material bills and other costs incurred by the First Party in connection with the construction of the work have been paid in full, final payment on account of this agreement shall be made within thirty (30) days after the completion by the First Party of all work covered by this agreement and the acceptance of such work by the Second Party.

6. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bonds hereto attached for its faithful performance, the Second Party shall deem the surety or sureties upon such bonds to be unsatisfactory, or if, for any reason, such bonds cease to be adequate to cover the performance of the work, the First Party shall, at its expense, within five (5) days after the receipt of notice from the Second Party so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Second Party. In such event no further payment to the First Party shall be deemed to be due under this agreement until such new or additional security for the faithful performance of the work shall be furnished in manner and form satisfactory to the Second Party.

7. The Party of the First Part attest that it and all of its subcontractors have fully complied with all requirements of MCGS 64 Article 2 in regards to E-Verification as required by Section 2.(c) of Session Law 2013-418, codified as N.C. Gen. Stat. 143-129(j).

IN WITNESS WHEREOF, the Parties hereto have executed this agreement on the day and date first above written in _____ counterparts, each of which shall without proof or accounting for other counterparts, be deemed an original contract.

Witness:

_____
Contractor: (Trade or Corporate Name)

_____
(Proprietorship or Partnership)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec. only)

The State of North Carolina through*

(CORPORATE SEAL)

_____
(Agency, Department or Institution)

Witness:

_____

By: _____

Title: _____

FORM OF PERFORMANCE BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal (Contractor) _____

Name of Surety: _____

Name of Contracting Body: _____

Amount of Bond: _____

Project

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:

_____
(Proprietorship or Partnership)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

_____
Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

_____
(Surety Company)

Witness:

_____

By: _____

Title: _____
(Attorney in Fact)

Countersigned:

_____

_____
(N.C. Licensed Resident Agent)

(Surety Corporate Seal)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C. Regional or Branch Office Address

FORM OF PAYMENT BOND

Date of Contract: _____

Date of Execution: _____

Name of Principal (Contractor) _____

Name of Surety: _____

Name of Contracting Body: _____

Amount of Bond: _____

Project _____

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in _____ counterparts.

Witness:

_____
(Proprietorship or Partnership)

Attest: (Corporation)

By: _____

Title: _____
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

_____
Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

_____
(Surety Company)

Witness:

_____

By: _____

Title: _____
(Attorney in Fact)

Countersigned:

_____

_____
(N.C. Licensed Resident Agent)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C.
Regional or Branch Office Address

(Surety Corporate Seal)

Sheet for Attaching Power of Attorney

Sheet for Attaching Insurance Certificates

APPROVAL OF THE ATTORNEY GENERAL

CERTIFICATION BY THE OFFICE OF STATE BUDGET AND MANAGEMENT

Provision for the payment of money to fall due and payable by the

_____

under this agreement has been provided for by allocation made and is available for the purpose of carrying out this agreement.

This _____day of _____ 20___.

Signed _____
Budget Officer