

POST OFFICE RENOVATION APPALACHIAN STATE UNIVERSITY

Miles Annas Student Services Building, 1st Floor
Boone, NC

CONSTRUCTION DOCUMENTS

PROJECT MANUAL

CONSTRUCTION SET



STUDIO ARCHIBENE, PLLC

321 E Chapel Hill St., Ste 207
Durham, NC 27701
T: 919.804.8989
www.archibene.com

Date: February 1, 2024

S/A Project #: 2305.00

SCO – ID #: 23-26971-01A

DOCUMENT 00 01 01

PROJECT TITLE PAGE

1.1 PROJECT MANUAL OUTLINE SPECIFICATIONS

- A. Project: Post Office Renovation
- B. Owner: State of North Carolina – Appalachian State University – Boone, NC
- C. ASU Project #: 20230511
- D. SCO ID #: 23-26971-01A
- E. Architect Project No.: S/A Project Number 2305.00
- F. Architect:

Studio Archibene, PLLC

321 E. Chapel Hill St.
Suite 207
Durham, NC 27701
919-597-0584

- G. Project Design Team:

1. Structural Engineer:

SDL & Associates
1307 West Morehead Street
Suite 109
Charlotte, NC 28208
704-333-3122

2. MEP Engineering

Salas O'Brien
1620 Midtown Place
Raleigh, NC 27609
919-832-8118

3. Lighting Designer

Light Defines Form
3116 Northline Ave
Box 4465
Greensboro, NC 27408
336-230.1990

- H. Issued: February 1, 2024
- I. Copyright 2024, Studio Archibene. All rights reserved.

END OF DOCUMENT

DOCUMENT 00 01 07

SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

Studio Archibene, PLLC

321 E. Chapel Hill St.
Suite 207
Durham, NC 27701
Kenneth H. Luker – NCRA #8928



1. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.

B. Structural Engineer:

SDL & Associates

1307 West Morehead Street
Suite 109
Charlotte, NC 28208
William D Bulla III – NCPE #13362



1. Responsible for Section 05 4000 Cold-Formed Metal Framing

C. Plumbing and HVAC Engineer:

Salas O'Brien

1620 Midtown Place
Raleigh, NC 27609
Christopher M Martin – NCPE #028630



1. Responsible for – Division 22 Specification Sections
2. Responsible for – Division 23 Specification Sections

D. Electrical Engineer:

Salas O'Brien

1620 Midtown Place
Raleigh, NC 27609
Addison Dee – NCPE #42004



1. Responsible for
 - a. Division 26 Specification Sections

END OF DOCUMENT

ADVERTISEMENT FOR BIDS

Sealed proposals will be received until 3:00 PM, local time, on Thursday, March 14, 2024, in the Planning, Design, and Construction offices of Appalachian State University, 2458 Hwy 105, Boone, NC 28607 for the Campus Post Office Renovation, at which time and place bids will be opened and read.

A pre-bid meeting will be held at 3:00 PM, local time, on Thursday, February 22, 2024, at the project site. The meeting will address project specific questions, issues, bidding procedures and bid forms. The meeting will also identify preferred brand alternates and their performance standards. In accordance with GS133-3 and SCO procedures the following preferred brand items are being considered as Alternates by the Owner:

- A. Smart Lockers and Smart Mailboxes by TZ Limited.

Complete electronic plans and specifications for this project can be obtained from Studio Archibene, office@archibene.com, 919-804-8989, during normal office hours.

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

Signed: Jeff Pierce
Planning, Design and Construction
Appalachian State University
2458 Hwy 105
Boone, NC 28607
828-262-4961

NOTICE TO BIDDERS

Sealed proposals will be received by Appalachian State University, in Boone, NC, in the office of Planning, Design and Construction, located at 2458 Hwy 105, Boone, NC 28607 up to 3:00 pm, local time, on Thursday March 14, 2024, and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of:

Campus Post Office Renovation

Project consists of renovating approximately 4,800 square feet of the existing Campus Post Office with selective demolition and new construction for postal mailboxes, service counters, postal lobby, and a new passport office. Work includes wall construction, electrical, HVAC ductwork, selective plumbing, millwork and finishes. The Owner may procure and install the smart lockers and mailboxes, or the scope may be included in the Work of the Contractor.

Bids will be received for a Single Prime Contract. All proposals shall be lump sum.

Pre-Bid Meeting

An open pre-bid meeting will be held for all interested bidders on 3:00 PM, local time, on Thursday, February 22, 2024, at 3:00pm at the project site, App State University, Miles Annas Student Services Building, 1st Floor, Boone, NC. The meeting will address project specific questions, issues, bidding procedures and bid forms.

The meeting is also to identify preferred brand alternates and their performance standards that the owner will consider for approval on this project.

In accordance with GS133-3 and SCO procedures the following preferred brand items are being considered as Alternates by the owner for this project:

- A. Smart Lockers and Smart Mailboxes by TZ Limited.

Justification of any approvals will be made available to the public in writing no later than seven (7) days prior to the bid date.

Complete plans, specifications and contract documents will be open for inspection in the offices of Planning, Design, and Construction at Appalachian State University and Studio Archibene, PLLC and in the plan rooms of the Associated General Contractors, Carolinas Branch, in the local North Carolina offices of McGraw-Hill Dodge Corporation, and in the Eastern Regional Office of Reed Construction Data in Norcross, GA and in the Hispanic Contractors Association of the Carolinas (HCAC) in Winston-Salem, Charlotte and Raleigh Areas – 877-227-1680

NOTE: The bidder shall include with the bid proposal the form *Identification of Minority Business Participation* identifying the minority business participation it will use on the project and shall include either *Affidavit A* or *Affidavit B* as applicable. Forms and instructions are included within the Proposal Form in the bid documents. Failure to complete these forms is grounds for rejection of the bid. (GS143-128.2c Effective 1/1/2002.)

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

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

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 a payment bond will be required for one hundred percent (100%) of the contract price.

Payment will be made based on 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 30 days.

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

Designer:

Studio Archibene, PLLC
321 E. Chapel Hill St., Suite 207
Durham, NC 27701
919-804-8989
office@archibene.com

Owner:

Planning, Design, and Construction
Appalachian State University
2548 Hwy 105
Boone, NC 28607

DOCUMENT 00 01 10

TABLE OF CONTENTS

DIVISION 00	INTRODUCTORY INFORMATION
00 01 01	PROJECT TITLE PAGE
00 01 07	SEALS PAGE
	NEWSPAPER ADVERTISEMENT
	NOTICE TO BIDDERS
00 01 10	TABLE OF CONTENTS
	INSTRUCTIONS TO BIDDERS AND GENERAL CONDITIONS OF THE CONTRACT
	SUPPLEMENTARY GENERAL CONDITIONS
	GUIDELINES FOR MBE PARTICIPATION
DIVISION 01	GENERAL REQUIREMENTS
01 10 00	SUMMARY
01 21 00	ALLOWANCES
01 22 00	UNIT PRICES
01 23 00	ALTERNATES
01 25 00	SUBSTITUTION PROCEDURES
01 31 00	PROJECT MANAGEMENT AND COORDINATION
01 32 00	CONSTRUCTION PROGRESS DOCUMENTATION
01 33 00	SUBMITTAL PROCEDURES
01 40 00	QUALITY REQUIREMENTS
01 50 00	TEMPORARY FACILITIES AND CONTROLS
01 60 00	PRODUCT REQUIREMENTS
01 73 00	EXECUTION
01 77 00	CLOSEOUT PROCEDURES
01 78 39	PROJECT RECORD DOCUMENTS
01 99 13	GENERAL REQUIREMENTS FOR DIVISIONS 21-28 WORK
DIVISION 02	EXISTING CONDITIONS
02 41 19	SELECTIVE DEMOLITION
DIVISION 03	CONCRETE
03 54 13	GYPSUM CEMENT UNDERLAYMENT
DIVISION 05	METALS
05 40 00	COLD-FORMED METAL FRAMING
05 50 00	METAL FABRICATIONS
DIVISION 06	WOOD, PLASTICS, AND COMPOSITES
06 40 00	ARCHITECTURAL WOODWORK
DIVISION 07	THERMAL AND MOISTURE PROTECTION
07 92 00	JOINT SEALANTS
DIVISION 08	OPENINGS
08 11 13	HOLLOW METAL FRAMES
08 14 16	FLUSH WOOD DOORS
08 33 13	COILING COUNTER DOORS
08 71 00	DOOR HARDWARE

DIVISION 09	FINISHES
09 22 16	NON-STRUCTURAL METAL FRAMING
09 29 00	GYPSUM BOARD
09 51 13	ACOUSTICAL PANEL CEILINGS
09 54 26	SUSPENDED WOOD GRILLE CEILING
09 65 00	RESILIENT FLOORING AND ACCESSORIES
09 68 13	TILE CARPETING
09 72 00	WALL COVERING
09 91 00	PAINTING
DIVISION 10	SPECIALTIES
10 11 00	VISUAL DISPLAY UNITS
10 14 00	SIGNAGE
10 26 00	WALL PROTECTION
10 44 00	FIRE PROTECTION SPECIALTIES
10 55 54	SMART LOCKERS AND SMART MAILBOXES
DIVISION 22	PLUMBING
22 02 10	PLUMBING SUMMARY OF WORK
22 05 29	PLUMBING HANGERS AND SUPPORTS
22 07 00	PLUMBING INSULATION
22 14 16	STORM WATER PIPING
DIVISION 23	HEATING, VENTILATION AND AIR CONDITIONING
23 02 10	HVAC SUMMARY OF WORK
23 05 10	HVAC BASIC REQUIREMENTS
23 05 29	HANGERS AND SUPPORTS FOR PIPING, DUCTWORK & EQUIPMENT
23 05 53	HVAC PAINTING AND IDENTIFICATION
23 05 93	HVAC TESTING, ADJUSTING, AND BALANCING
23 07 13	HVAC DUCT INSULATION
23 31 00	HVAC DUCTWORK
23 33 00	AIR DUCT ACCESSORIES
23 37 13	DIFFUSERS, REGISTERS, AND GRILLES
DIVISION 26	ELECTRICAL
26 00 00	SUMMARY OF ELECTRICAL WORK
26 05 00	BASIC ELECTRICAL REQUIREMENTS
26 05 19	SECONDARY VOLTAGE WIRES AND CABLES
26 05 26	GROUNDING
26 05 29	SUPPORTING DEVICES
26 05 33	ELECTRICAL IDENTIFICATION
26 05 34	RACEWAYS
26 05 35	ELECTRICAL BOXES AND FITTINGS
26 08 00	TESTING AND PLACING IN SERVICE
26 09 23	LIGHTING CONTROL DEVICES
26 27 26	WIRING DEVICES
26 28 16	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
26 51 00	INTERIOR LIGHTING FIXTURES
DIVISION 27	COMMUNICATIONS
27 20 00	TELEPHONE/DATA SYSTEMS APPALACHIAN STATE UNIVERSITY COMMUNICATIONS STANDARDS
DIVISION 28	ELECTRONIC SAFETY AND SECURITY
28 31 10	FIRE ALARM SYSTEM MODIFICATIONS RECORD OF COMPLETION FORM

FORMS

FORM OF PROPOSAL
MBE CONTRACTOR LIST AND AFFIDAVITS A THROUGH D
FORM OF BID BOND
FORM OF CONSTRUCTION CONTRACT
FORM OF PERFORMANCE BOND
FORM OF PAYMENT BOND
SHEET FOR ATTACHING POWER OF ATTORNEY
SHEETS FOR ATTACHING INSURANCE CERTIFICATES
APPROVAL OF THE ATTORNEY GENERAL
OFFICE OF STATE BUDGET AND MANAGEMENT

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

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 than 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 solely 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 work of their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under Method "c(2)" and Paragraph (b) above, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.
- e. The term "net cost" as used herein shall mean the difference between all proper cost additions and deductions. The "cost" as used herein shall be limited to the following:
1. The actual costs of materials and supplies incorporated or consumed as part of the work;
 2. The actual costs of labor expended on the project site; labor expended in coordination, change order negotiation, record document maintenance, shop drawing revision or other tasks necessary to the administration of the project are considered overhead whether they take place in an office or on the project site.
 3. The actual costs of labor burden, limited to the costs of social security (FICA) and Medicare/Medicaid taxes; unemployment insurance costs; health/dental/vision insurance premiums; paid employee leave for holidays, vacation, sick leave, and/or petty leave, not to exceed a total of 30 days per year; retirement contributions; worker's compensation insurance premiums; and the costs of general liability insurance when premiums are computed based on payroll amounts; the total of which shall not exceed thirty percent (30%) of the actual costs of labor;
 4. The actual costs of rental for tools, excluding hand tools; equipment; machinery; and temporary facilities required for the work;
 5. The actual costs of premiums for bonds, insurance, permit fees, and sales or use taxes related to the work.

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

- f. Should concealed conditions be encountered in the performance of the work below grade, or should concealed or unknown conditions in an existing structure be at variance with the conditions indicated by the contract documents, the contract sum and time for completion may be equitably adjusted by change order upon claim by either party made within thirty (30) days after the condition has been identified. The cost of such change shall be arrived at by one of the foregoing methods. All change orders shall be supported by a unit cost breakdown showing method of arriving at net cost as defined above.
- g. 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 responsibilities 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 progress, defective construction not remedied, disputed work, or third-party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

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 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, 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.

SUPPLEMENTARY GENERAL CONDITIONS

GENERAL

The following SUPPLEMENTARY GENERAL CONDITIONS modify, delete and/or add to the "Instructions to Bidders and General Conditions of the Contract", State Construction Office Department of General Administration, 24th Edition January 2013, Articles 1 through 54 inclusive. Where any original article, paragraph, subparagraph, or clause is supplemented, the provisions of such article, paragraph, subparagraph, or clause shall remain in effect and the supplemental provisions shall be considered as added thereto. Where any original article, paragraph, subparagraph, or clause is amended, voided, or superseded by any of the following paragraphs, the provisions of such article, paragraph, subparagraph, or clause not so amended, voided or superseded shall remain in effect.

INSTRUCTIONS TO BIDDERS

Add the following subparagraph at the end of paragraph 2:

"By submitting a bid, the Bidder represents that he has reviewed all Contract Documents and that the cost of all materials and equipment shown or indicated in the Contract Documents have been included in the Bid Sum and that all costs for materials and labor associated with the installation of such equipment have been included in the Bid Sum."

GENERAL CONDITIONS OF THE CONTRACT

ARTICLE 1 - DEFINITIONS

Add the following at the end of paragraph c:

"The terms designer, A-E, architect, architect-engineer, engineer, and engineer-architect, etc., when used in these Contract Documents, shall, unless otherwise specifically defined, mean Studio Archibene, PLLC, 321 E. Chapel Hill St., Suite 207, Durham, NC 27709."

Revise paragraph r to read as follows:

"**Inspection** shall mean observation by the designer(s) of the work completed or in progress only to determine if such work is generally in accordance with the requirements of the Contract Documents."

ARTICLE 2 – INTENT AND EXECUTION OF DOCUMENTS

Add the following paragraphs

d. Contract Drawings

The Contract drawings contain information to a degree of detail which is considered to be both consistent with their scales and adequate to accomplish their purpose. Beyond this point they are diagrammatic. The Contractor shall provide all miscellaneous materials required to completely install the work in accordance with the intent of the drawings and the specified functions. Any omissions from either the drawing or the specifications are unintentional and it shall be the responsibility of the Contractor to call to the attention of the Designer any pertinent omissions prior to submission of a bid.

e. The Contractor shall not scale any drawing to determine lengths and distances and shall refer only to indicated dimensions.

ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA

Revise paragraph d to read as follows:

"d. Submittal review by the designer shall be only for the limited purpose of checking for conformance with the design concept and the information expressed in the Contract Documents. This review shall not include review of the accuracy or completeness of details, such as quantities, dimensions, weights or gauges, fabrication processes, construction means or methods, coordination of the work with other trades or construction safety precautions, all of which shall be the sole responsibility of the Contractor. Review of a specific item shall not indicate that the designer has reviewed the entire assembly of which the item is a component. The designer shall not be required to review partial submissions or those for which submissions of correlated items have not been received."

ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS

Add the following paragraphs to read as follows:

"e. Permits and Fees: The Contractor shall be responsible for obtaining all permits and fees required for the installation of their work and shall determine the amounts prior to bidding and shall include this (these) amount(s) in the bid. In no case will any extra charge be allowed unless authorized in writing by the Designer.

Under state law local jurisdiction building permits are not required of the owner and consequently the contractor."

"f. Building Code: The work executed under this contract shall be done in accordance with the applicable North Carolina State Building Codes, all codes published by the National Fire Protection Association (NFPA), and all other local and state codes which may apply. The editions of these codes in effect on the date of advertisement of bids shall be incorporated by reference into the construction documents."

ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC

Add new paragraph j:

"j. In the event the Contractor encounters on the site material reasonably believed to be asbestos (see Article 48), polychlorinated biphenyl (PCB), or any other material deemed 'hazardous' by the U.S. Environmental Protection Agency, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and designer in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is 'hazardous' and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of 'hazardous materials', or when it has been rendered harmless, by written agreement of the Owner and Contractor. Lead and/or lead based paint is hereby specifically excluded from this section. The Contractor may be required to work with lead and/or lead based paint as a normal part of the construction process."

Add new paragraph k:

"k. Neither the professional activities of the Designer, nor the presence of the Designer or the Designer's employees and subconsultants at a construction site, shall relieve the Contractor(s) and any other entity of their obligations, duties, and responsibilities including, but not limited to, construction means, methods, sequences, techniques, or procedures necessary for performing, superintending, or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Designer and Designer's personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor(s) is solely responsible for

jobsite safety. The Designer and the Designer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy."

ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE

Add new paragraph m as follows:

"m. The project expediter shall be the single prime Contractor."

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

Add the following sentence after the first sentence of paragraph a:

"The Contractor shall achieve Final Completion of the entire Work not later August 9, 2024, subject to adjustments of this Contract time as provided in the Contract Documents."

Add the following sentence at the end of paragraph b:

"The sum of liquidated damages shall be Two-Hundred Fifty Dollars (\$ 250.00) per day."

ARTICLE 25 – FINAL INSPECTION, ACCEPTANCE AND PROJECT CLOSEOUT

Append the following to paragraph b2:

"A subsequent review shall be scheduled by the designer upon Contractor's notification to the designer that the discrepancies listed in the punch list have been corrected in their entirety by the contractor."

ARTICLE 31 - REQUEST FOR PAYMENT

Revise the first sentence only of Article 31a, General Conditions, to read as follows:

"Not later than the last day of the month, the contractors shall submit to the Designer a request for payment for work done through the 25th day of the month." The Owner will make payment by the end of the following calendar month, in the manner described in Articles 31 through 33 of the General Conditions.

Add the following paragraphs f and g, to read as follows:

- f. Refund of Sales and Use Taxes: North Carolina General Statute 105-164.14(e) authorizes refunds to the state of county sales and use taxes paid by contractors on materials which are incorporated into a state building or structure. The Contractor shall report all county sales and use taxes paid, in accordance with Article 4.31.2.
- g. Submittal of Tax Forms: The Contractor shall attach to each request for payment certified statements of county sales and use taxes paid on materials claimed for payment on the request. Certified statements in the same format shall be obtained from all subcontractors and provided with the request for payment. The Designer will not approve payment for any materials until the supporting county tax statement has been provided. The statement must include the cons 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. These certified statements may be subject to audit. Contractors shall not include any tax paid on supplies, tools and equipment, which they use to perform their contracts and shall include only those building materials, supplies, fixtures and equipment which actually become a part of or annexed to the building or structure. 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, you should identify the county where delivery is made when reporting the county tax."

ARTICLE 34 – MINIMUM INSURANCE REQUIREMENTS

Add the sub-paragraph 1 to paragraph e, to read as follows:

- 1) Provide Motor Vehicle Insurance, with coverage in accordance with ASU, North Carolina and statutory requirements."

Add the following paragraphs "g" and "h" to read as follows

"g. Certificate of Insurance (COI) Special Instructions

- 1) On each Certificate of Insurance in the section designated as "Description of Operations" include a scope of work for each COI.
- 2) Include the following: "Notwithstanding the preprinted cancellation provisions on this form, coverages afforded under the policies will not be cancelled, reduced in amount nor will any coverages be 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"
- 3) Certificate Holder - Shown as: Appalachian State University, 438 Academy Street, ASU PO Box 32050, Boone, NC 28608.

h. Requirements for each policy on the COI page which pertains to the project work:

- 1) An Endorsement page (document), clearly shown for each policy, to support the changes shown on the COI. If for example Liability, Automobile, and an Umbrella policy are required, then three separate documents (endorsements) are needed.
- 2) Notice of cancellation requirements (with verbiage above), to be clearly shown separately for each policy.
- 3) Documentation shall include confirmation of Appalachian State University as 'Additional Insured' entity.

END OF SECTION

GUIDELINES FOR RECRUITMENT AND SELECTION OF MINORITY BUSINESSES FOR PARTICIPATION IN UNIVERSITY OF NORTH CAROLINA 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 University of North Carolina construction projects in the amount of \$300,000 to \$2,000,000. The legislation provides that the State (University of North Carolina) 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 through The University 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 constituent 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 University of North Carolina 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. The University of North Carolina

The University of North Carolina will be responsible for the following:

- a. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal prior to award of contracts. The State (University of North Carolina) reserves the right to reject any or all bids and to waive informalities.
- b. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
- c. Providing statistical data and required reports to the HUB Office.

d. Resolving any protest and disputes arising after implementation of the plan.

3. Constituent Institutions of The University of North Carolina

Before awarding a contract, constituent institution shall do the following:

- a. Implement the University of North Carolina HUB plan.
- 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 University of North Carolina.
- g. Evaluate documentation to determine good faith effort has been achieved for minority business utilization prior to recommendation of award to University of North Carolina.
- h. Review prime contractors' pay applications for compliance with minority business utilization commitments prior to payment.
- i. Document evidence of implementation of Owner's responsibilities.

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 University of North Carolina.
- f. Make documentation showing evidence of implementation of Designer's responsibilities available for review by University of North Carolina 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 bidding, 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 University of North Carolina 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, University of North Carolina, 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 D: 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 E: These guidelines shall apply upon promulgation on University construction projects. Copies of these guidelines may be obtained from The University of North Carolina, (physical address) 910 Raleigh Road, Chapel Hill North Carolina, 27515, (mail address) PO Box 2688, Chapel Hill, North Carolina, 27515-2688, phone (919) 962-1000, Website:

http://www.northcarolina.edu/info/vendors/UNC_HUB_Guidelines2002_Rev 7-10

SECTION F: In addition to these guidelines, there will be issued with each construction bid package provisions for contractual compliance providing MBE participation in State building projects. An explanation of the process follows, titled “MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)” along with relevant forms for its implementation (“Identification of Minority Business Participation” form, Affidavits A, B, C, D and Appendix E).

MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

APPLICATION:

The **Guidelines for Recruitment and Selection of Minority Businesses for Participation in University of North Carolina 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 University of North Carolina, (physical address) 910 Raleigh Road, Chapel Hill North Carolina, 27515, (mail address) PO Box 2688, Chapel Hill, North Carolina, 27515-2688, phone (919) 962-1000, Website:
http://www.northcarolina.edu/info/vendors/UNC_HUB_Guidelines2002_Rev 7-10

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 (by using the “Identification of Minority Business Participation” form provided in the bid document), the minority businesses that will be utilized on the project with corresponding total dollar value of the bid. In addition, the bidder must submit with his/her bid an 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, if the portion of work to be performed by minority firms is equal to or greater than 10% of the bidder’s total contract price. Affidavit C includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, and lists the participating minority firms with the dollar value of their contracts.

OR

Provide Affidavit D, if the portion of work to be performed by minority firms is less than 10% of the bidder’s total contract price. Affidavit D includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, lists the participating minority firms with the dollar value of their contracts and includes **documentation of Good Faith Effort**.

OR

Have provided Affidavit B with his/her bid as noted above, 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.

Summary of required submissions:

(use check boxes to assist in ensuring that all appropriate forms are submitted)

**ALL BIDDERS SUBMIT
WITH THEIR BID:**

- “Identification of Minority Business Participation” form

AND EITHER

- Affidavit A – “Listing of Good Faith Efforts”

OR

- Affidavit B – “Intent to Perform Contract with Own Workforce”

**IN ADDITION, THE
APPARENT LOWEST
RESPONSIVE,
RESPONSIBLE BIDDER
SUBMITS (IF HE HAS
NOT SUBMITTED
AFFIDAVIT B):**

- Affidavit C – “Portion of the Work to be Performed by Minority Firms” if the percentage of work to be performed by minority firms is 10% or more. This form is to be submitted within 72 hours of notification of being low bidder.

OR

- Affidavit D “Good Faith Efforts” if the percentage of work to be performed by minority firms is less than 10%.

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 (University of North Carolina) 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 (The University of North Carolina) 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 (The University of North Carolina) whether to terminate the contract for breach.

In determining whether a contractor has made Good Faith Efforts, the University of North Carolina 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 to be made to minority business contractors 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**) Socially and Economically Disadvantaged (**D**)

Date: _____

Approved/Certified By: _____

Name

Title

Signature

Signature certifies that any minority firms not previously verified in the bid/award process have been appropriately verified, services have been rendered, and payment is due as processed.

****THIS DOCUMENT MUST BE SUBMITTED WITH EACH PAY REQUEST & FINAL PAYMENT****

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Project information.
 2. Work covered by Contract Documents.
 3. Contractor's use of site and premises.
 4. Work restrictions.
 5. Specification and Drawing conventions.

1.2 PROJECT INFORMATION

- A. Project Identification: Post Office Renovation
1. Project Location: Appalachian State University – Boone, NC
- B. Owner: State of North Carolina – Appalachian State University - Boone, NC
1. Owner's Representative: Jacki McGuire, NCIDQ, IIDA, ASID
- C. Architect:
- Studio Archibene, PLLC**
321 E. Chapel Hill St.
Suite 207
Durham, NC 27701
919-597-0584
- D. Structural Engineer
- SDL & Associates**
1307 West Morehead Street
Suite 109
Charlotte, NC 28208
704-333-3122
- E. Electrical, Plumbing, Mechanical Engineering
- Salas O'Brien**
1620 Midtown Place
Raleigh, NC 27609
919-832-8118
- F. Lighting Designer
- Light Defines Form**
3116 Northline Ave
Box 4465
Greensboro, NC 27408
336-230.1990

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. The Post Office Renovation is limited to approximately 8000 square feet of the first floor of the Miles Annas Student Services Building. The existing student mailboxes will be removed. The mailboxes will be replaced by TZ Lockers and Mailboxes for the campus student population. Procurement and installation of the TZ Lockers is not in the scope to be performed by the Contractor, however coordination with the TZ Locker and Mailbox supplier will be critical to the project's success. Both the existing mail drop and faculty mailboxes will be removed and reinstalled as part of the Contractor's scope of work.
 2. In addition to preparing for the TZ Lockers and Mailboxes, the existing Postal Lobby will receive new finishes, the adjacent Postal Service Room will be reconfigured, and new finishes installed.
 3. A new Passport Office will be constructed adjacent to the postal Service Room with direct access to the Postal Lobby and a Passport Waiting Area.
- B. Type of Contract:
1. Project will be constructed under a single prime contract.

1.4 COORDINATION WITH SEPARATE CONTRACTOR – LOCKER AND MAILBOX WORK

- A. Refer to Section 10 55 54 – for coordination items when smart lockers and smart mailboxes are procured and installed by the Owner.

1.5 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated. Additional disturbance areas may be approved by ASU Design and Construction as necessary.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1.7 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours Restrictions: Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, except otherwise indicated.
1. Weekend Hours: As needed and approved by project manager.

2. Early Morning Hours: As needed and approved by project manager.
 3. Hours for Utility Shutdowns: As needed and approved by project manager.
 4. Hours for other disruptive activities will be discussed and approved by project manager as needed.
 5. Prohibited Working Hours: Construction activities are not allowed on the dates of graduation, which occur two days in December and two days in May. In addition, construction may cease, be limited, or temporarily curtailed when they conflict with the University's operations.
- C. In most cases, the University will require the Contractor to comply with the Town of Boone Noise Ordinance; however, there are other situations where stricter noise control is required.
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Architect's written permission before proceeding with disruptive operations.
- E. Fire Arms: No firearms, concealed or otherwise, are permitted on campus.
- F. Drug and Tobacco-Free Workplace Requirement: The University is a drug-free and Tobacco-free workplace. No drugs, tobacco, or alcohol are permitted on campus and employees on the work site under the influence of such substances shall be deemed sufficient cause for the University to permanently remove that individual from the project and University property. Such action shall not constitute grounds for a delay claim.
- G. Blasting: Blasting on University property is prohibited unless given prior approval by the project manager.
- H. Access for Deliveries: Schedule deliveries to minimize use of driveways and entrances. Road and sidewalk blockages shall be scheduled forty eight (48) hours in advance and may occur only after the University's approval. Warning signs, barricades, and detour information shall be placed as needed to accommodate, adequately warn, and protect campus pedestrians, including the handicapped. If required, flagmen shall direct traffic around the construction or detour area. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site. All deliveries should be coordinated with the Post Office staff to avoid interruption to US Mail operations.
- I. Road, Driveway, Entrance, and Sidewalk Closings: The contractor shall make requests for approval for any street, alley, entrance, driveway, access way, or sidewalk to be closed at least forty eight (48) hours prior to the date desired for closing. No such access will be closed without prior approval by the University. Pedestrian and vehicle traffic way-finding around the construction limits must be maintained in a clean and safe condition at all times.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.

4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00

ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include quantity allowances.

1.2 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.3 QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.4 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other markups.
 - 3. Submit substantiation of a change in scope of Work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of Work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Quantity Allowance: Include 200 square feet of Custom Graphic Wallcovering, including, full color, high resolution printing. Graphic to be provided by the University.

END OF SECTION

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

- A. Unit price is an amount incorporated into the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
 - 1. Work to be reviewed and quantified by the Owner's industrial hygiene consultant/air monitor prior to and after Work of an area/location is completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 1– Custom Graphic Wallcovering (WC01)
 - 1. Unit of Measure: Per Square Foot

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other work of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 01: Wood Accent Ceiling (WD01)
 - 1. Base Bid: Paint Exposed Structure
 - 2. Alternate: WD01 (Suspended Wood Grille Ceiling) in areas indicated.
- B. Alternate No. 02: Flex Duct Connections
 - 1. Base Bid: Clean, Tape, and Seal Existing Flex Duct Connections per SMACNA Standards.
 - 2. Alternate: Replace Existing Flex Duct Connections with Rigid Ducts
- C. Alternate No. 03: Radiant Heating Panels
 - 1. Base Bid: No Radiant Heating Panels
 - 2. Alternate: Radiant Heating Panels as indicated on Drawings.

- D. Alternate No. 04: Smart Lockers and Smart Mailboxes
1. Base Bid: Procurement and installation of smart lockers and smart mailboxes and lockers is by Owner. Work will be performed concurrently with renovation and require General Contractor coordination.
 2. Alternate: Procurement and installation of smart lockers and smart mailboxes will be within the scope of the General Contractor for this project. Smart lockers and smart mailboxes by any of the listed manufacturers listed in Section 10 55 54 – Smart Lockers and Smart Mailboxes
- E. Alternate No. 05: Preferred Brand Smart Lockers and Smart Mailboxes
1. Base Bid: Procurement and installation of smart lockers and smart mailboxes and lockers is by Owner. Work will be performed concurrently with renovation and require General Contractor coordination.
 2. Alternate: Procurement and installation of smart lockers and smart mailboxes will be within the scope of the General Contractor for this project. Smart lockers and smart mailboxes by TZ, in lieu of other listed Manufacturers.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.

- I. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution in accordance with Article 8 of the General Conditions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 1. General coordination procedures.
 2. RFIs.
 3. Project meetings.

1.2 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

1.3 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.4 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Owner name.
 2. Owner's Project number.
 3. Name of Architect.
 4. Architect's Project number.
 5. Date.
 6. Name of Contractor.
 7. RFI number, numbered sequentially.
 8. RFI subject.
 9. Specification Section number and title and related paragraphs, as appropriate.
 10. Drawing number and detail references, as appropriate.
 11. Field dimensions and conditions, as appropriate.
 12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 13. Contractor's signature.
 14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Log with not less than the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.

- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.

1.5 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model and CAD drawings will be provided by Architect for Contractor's use during construction.
 - 1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 - 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 - 3. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
 - a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.
- B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
- B. Preconstruction Conference: Designer will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
 - 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Notice to Proceed Date
 - c. Tentative construction schedule.
 - d. Phasing.
 - e. Critical work sequencing and long lead items.
 - f. Designation of key personnel and their duties.
 - g. Lines of communications.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.

- r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 - bb. Additional items as requested by any of the participants.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility requirements.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written instructions.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Designer will conduct progress meetings on a weekly basis at the project site.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress schedule on a bi-weekly basis. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Design will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Contractor's to revise construction schedule at a minimum, prior to every other progress meeting and after progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Construction schedule updating reports.
 - 3. Daily construction reports.
 - 4. Site condition reports.
- B. Refer to Article 14 – Construction Supervision and Schedule of the General Conditions of the Contract (OC-15)

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Working electronic copy of schedule file.
 - 2. PDF file.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.

- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for each activity, sorted in ascending order by activity number and then by early start date, or actual start date if known.
 - 3. Total Float Report: List of activities sorted in ascending order of total float.
- E. Construction Schedule Updating Reports: Submit updated construction prior to every other Progress Meeting.
- F. Site Condition Reports: Submit at time of discovery of differing conditions.

1.4 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Prepare in accordance with General Conditions of the Contract.
- B. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 14 days, unless specifically allowed by Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 - 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 - 5. Commissioning Time: Include no fewer than 15 days for commissioning.
 - 6. Final Inspection and Acceptance in accordance with the General Conditions.
- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.

- b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Use-of-premises restrictions.
 - e. Provisions for future construction.
 - f. Seasonal variations.
 - g. Environmental control.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Final Inspection, Acceptance and Project Closeout.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and the Contract Time.
- G. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities
- 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- H. Recovery Schedule: When periodic update indicates the Work is 10 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

1.6 CPM SCHEDULE REQUIREMENTS

- A. CPM Schedule: Prepare Contractor's Construction Schedule using a time-scaled CPM network analysis diagram for the Work in accordance with the General Conditions.
- B. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
- 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and inspection.
 - j. Commissioning.
 - k. Punch list and final completion.
 - l. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.

1.7 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.

14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.

- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Submittal schedule requirements.
 - 2. Administrative and procedural requirements for submittals.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.3 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Refer to Article 5 – Shop Drawings, Submittals, Samples, Data as indicated in General Conditions of the Contract (OC-15)

1.4 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Architect.
 - 4. Name of Contractor.
 - 5. Name of firm or entity that prepared submittal.
 - 6. Names of subcontractor, manufacturer, and supplier.
 - 7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
 - 8. Category and type of submittal.
 - 9. Submittal purpose and description.
 - 10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
 - 11. Drawing number and detail references, as appropriate.
 - 12. Indication of full or partial submittal.
 - 13. Location(s) where product is to be installed, as appropriate.
 - 14. Other necessary identification.
 - 15. Remarks.
 - 16. Signature of transmitter.
- B. Options: Identify options requiring selection by Architect.
- C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on

previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

- D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.5 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 2. Paper: Prepare submittals in paper form, and deliver to Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 20 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow 20 days for review of each resubmittal.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.6 SUBMITTAL REQUIREMENTS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.

- g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. .
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 3. Paper Transmittal: Include paper transmittal including complete submittal information indicated.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
- E. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
 6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.7 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file and one paper copy of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.8 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
 - 1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Architect will return without review submittals received from sources other than Contractor.
- E. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

- H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
- B. Delegated-Design Services Statement: Submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Statement on condition of substrates and their acceptability for installation of product.
 2. Statement that products at Project site comply with requirements.
 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 5. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Statement that equipment complies with requirements.
 2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 3. Other required items indicated in individual Specification Sections.

1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
 - E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
 - F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
 - G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 - I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
 - J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- 1.8 QUALITY CONTROL
- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
 - B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's or Owner's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Owner's Testing Agency, Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and for testing and inspection equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, with copy to Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
 - 3. Indicate methods to be used to avoid trapping water in finished work.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Provisions for Utilities:
 - 1. Utilities provided by Owner for Contractor's project use: Fiber / Internet Connection and Water Tap at no cost.
 - 2. Utilities to be obtained and paid for directly by the Contractor: Power at the cost of the Contractor.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 - 1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E136. Comply with NFPA 241.
 2. Utilize designated area within existing building for temporary field offices.
 3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Parking for personal vehicles on campus is not provided as parking is extremely limited. Contractors must limit parking of company vehicles and storage of materials as can be accommodated within the limits of the construction site and staging area. Contractors are subject to the University's parking regulations. Parking permits may be obtained from the ASU Parking and Traffic Office Located at 400 University Hall Drive, 2nd Floor.
- D. Storage and Staging: Use designated areas of Project site for storage and staging needs. Parking, materials and equipment will be required to be contained within construction fence.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touch up signs so they are legible at all times.
- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

- D. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with Chapter 33 of the 2018 NC Fire Prevention Code.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
 - 4. Coordinate with Owner's designated fire prevention program superintendent.
 - a. Owner's designated fires prevention program superintendent is responsible for the fire prevention program and ensuring compliance.
 - b. Owner's fire prevention program superintendent does not replace Contractors responsibility for complying with relevant components of the NC Fire Prevention Code.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Architect's Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 7. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 8. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- B. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
- C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
 2. Evidence that proposed product provides specified warranty.

3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Installation of the Work.
 - 3. Cutting and patching.
 - 4. Progress cleaning.
 - 5. Starting and adjusting.
 - 6. Protection of installed construction.

1.2 INFORMATIONAL SUBMITTALS

- A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- B. Certified Surveys: Submit two copies signed by professional engineer for each site.

1.3 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on each Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Remove and replace damaged, defective, or non-conforming Work.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00 "Summary."
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.4 COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Completion. List items below that are incomplete at time of request.
 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 5. Submit testing, adjusting, and balancing records.
 6. Submit sustainable design submittals not previously submitted.

7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Acceptance: Before requesting final inspection for determining final acceptance, complete the following:
1. Certified List of Incomplete Items: Submit certified copy of Architect's Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 3. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:
 - a. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).

1.7 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
 1. Submit by uploading to web-based project software site.
- D. Warranties in Paper Form:
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 1. Complete the following cleaning operations before requesting inspection for certification of Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - c. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

- d. Sweep concrete floors broom clean in unoccupied spaces.
 - e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - f. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - g. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - h. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - i. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations, before requesting inspection for determination of Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit record digital data files and one set of plots.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit record digital data files and three sets of record digital data file plots.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

1.3 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.

- n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect
 - e. Name of Contractor.

1.4 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

1.5 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION

SECTION 019913 - GENERAL REQUIREMENTS FOR DIVISIONS 22-28 WORK

The "Engineer of Record" for the work defined by Division 01 Sections 019913 is Salas O'Brien, 1620 Midtown Place (27609), P.O. Box 19944 (27619), Raleigh, NC, (919) 832-8118. The term "engineer," "architect-engineer," "engineer-architect," "A-E," "E-A," etc., when used in these Sections shall reference Salas O'Brien.



The "Engineer of Record" for the work defined by Divisions 22-28 is Salas O'Brien., 1620 Midtown Place (27609), P.O. Box 19944 (27619), Raleigh, NC, (919) 832-8118. The term "engineer," "architect-engineer," "engineer-architect," "A-E," "E-A," etc., when used in Divisions 21-28 Drawings and Specifications shall reference Salas O'Brien.

PART 1 - GENERAL

RELATED DOCUMENTS

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

The requirements specified herein shall govern all Sections in Divisions 22-28, whether stated therein or not.

Where items specified in the other sections of this Division conflict with requirements of this Section, the former shall govern.

REVIEW OF CONTRACT DOCUMENTS

The Contract Documents may represent imperfect data and may contain errors, omissions, conflicts, inconsistencies, code violations and improper use of materials. Such deficiencies will be corrected by the A-E when identified. The Contractor shall carefully study and compare the individual Contract Documents with each other and report at once in writing to the A-E any deficiencies the Contractor may discover. The Contractor shall require each subcontractor to likewise study the documents and report at once any deficiencies discovered. The Contractor shall resolve all reported deficiencies with the A-E prior to starting any work. **Any work performed prior to receipt of instructions from the A-E will be done at the Contractor's risk.** If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency, or omission in the Contract Documents without such notice to the A-E, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

The Contractor shall be responsible for maintaining habitable structures under this Contract rainproof, and for making equipment and utility installations properly perform the intended function. If he is prevented from so doing by any limitations of the drawings or specifications, the Contractor shall immediately notify the A-E in writing of such limitations before proceeding with construction in the area where the problem or limitation exists.

1 **DEFINITIONS**

2
3 Mechanical Work: Work required by this Contract as defined by specification Division 22 (Plumbing), and Division 23
4 (Heating, Ventilating, and Air-Conditioning).

5
6 Electrical Work: Work required by this Contract as defined by specification Divisions 26-28.

7
8 Labeled: Appliances, equipment, materials or products to which has been attached a label, symbol, or other
9 identifying mark of an organization acceptable to the North Carolina Building Code Council and concerned with
10 product evaluation, that maintains periodic inspection of production of labeled equipment or materials and by whose
11 labeling the manufacturer indicates compliance with identified standards or has been tested and found suitable for a
12 specified purpose.

13
14 Listed: Appliances, equipment, materials or products included in a list published by an organization acceptable to the
15 North Carolina Building Code Council and concerned with product evaluation, that maintains periodic inspection of
16 production of listed equipment or materials, and whose listing states either that the equipment or material meets
17 appropriate designated standards or has been tested and found suitable for a specified purpose.

18
19 Concealed: Work within or behind various construction elements or in crawl spaces or trenches that is not exposed
20 to view when the project is complete.

21
22 Exposed: Not "concealed" as defined above, or anything exposed to view when the project is complete.

23
24 Wiring: Cable, raceways, fittings, mechanical supports, wire, junction boxes, device boxes, outlet boxes, switches,
25 cutouts, and related items.

26
27
28 **CODES, LAWS, REGULATIONS, AND STANDARDS**

29
30 Work on and for the project shall conform to requirements of each applicable volume of the *North Carolina Building*
31 *Code*; shall comply with the regulations of the N.C. Department of Labor, including the latest revisions and
32 interpretations of the *Occupational Safety and Health Act of North Carolina*; and be in accordance with all other
33 codes, laws, rules and regulations that apply to this project.

34
35 "Confined spaces" and "permit-requiring confined spaces", as defined by U.S. Occupational Safety and Health
36 Administration (USOSHA) may exist in the work area or may be created by the construction of this Project. The
37 Contractor shall be responsible for identification of any permit-requiring confined spaces and for establishing all
38 required procedures for meeting the requirements of USOSHA relative to these spaces, including written confined
39 space entry program(s).

40
41 Codes, laws, regulations, and/or industry standards referenced in the Specification or on the Drawings shall be
42 considered to be part of the Project requirements. Applicable edition of the referenced volume is the edition that
43 is/was in effect at the time the construction permit was issued or at the time of approval of the Contract Documents by
44 the Authority Having Jurisdiction.

45
46
47 **INTENT AND WORKMANSHIP**

48
49 The words "furnish," "furnish and install," "install," and "provide" or words with similar meaning shall be interpreted,
50 unless otherwise specifically stated, to mean "furnish and install complete in-place and ready for service."

51
52 The work of all trades under this Contract shall be coordinated in such a manner as to obtain the best workmanship
53 possible.

54
55 Miscellaneous items and accessories that are not specifically shown on the drawings or specified herein, but which
56 are essential to produce a complete and properly operating installation, or usable structure or plant, providing the
57 indicated function, shall be furnished and installed without change in the Contract price. Such miscellaneous items
58 and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and
59 other applicable characteristics, as specific for the major component of which the miscellaneous item or accessory is
60 an essential part. The above requirement, however, is not intended to include major components not covered by or
61 inferable from the drawings and specifications.

1 **QUALITY ASSURANCE**

2
3 The Contract Drawings indicate the extent and general arrangement of the Work. The Contractor shall coordinate the
4 Work under his Contract so as to avoid conflicts between his work and the work of other trades. He shall carefully
5 examine the Drawings and shall be responsible for the proper fitting of materials and equipment into the space
6 provided. If any departures from the Contract Drawings are deemed necessary by the Contractor, detail drawings of
7 such departures and the reasons therefore shall be submitted as soon as practicable to the A-E for his review. No
8 such departures shall be made without this review and written clarification or change order.

9
10 **If manufacturer recommended details or installation instructions differ from the contract drawings or**
11 **specifications, then the contractor shall notify the A-E immediately of any discrepancies.**

12
13 The Drawings and Specifications shall be considered supplementary, one to the other, so that materials and/or labor
14 indicated, called for, or implied by one and not the other shall be provided as though specifically called for in both.

15
16 Firestop Materials Codes and Standards: Comply with ASTM Standard E814 and applicable categories of UL's
17 current *Fire Resistance Directory*, Vol. I and II, for compliance with ANSI/UL Standard 1479.

18
19 Access Doors Fire-Resistance Ratings: Where fire-resistance rating is indicated for construction penetrated by
20 access units, provide Listed and Labeled units.

21
22
23 **OBSERVATION**

24
25 All work shall be done by skilled technicians, continuously supervised by the Contractor and subject to observation
26 and final acceptance by the A-E. Such final acceptance shall in no way relieve the Contractor from responsibility for
27 defects in either workmanship or material that may subsequently develop.

28
29
30 **SUBMITTALS**

31
32 Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this
33 specification. Material and equipment schedules, catalog cuts, manufacturers' data and shop drawings, and field
34 working drawings as required by individual Sections shall be provided.

35
36 Shop drawings, technical data and other such submittals required by individual Sections of the Divisions listed above
37 shall be provided.

38
39 Equipment drawings, manufacturer's installation instructions as shipped with the equipment, field working and
40 location drawings, wiring diagrams, and coordination drawings shall be provided by the Contractor for items of
41 equipment, sleeves, foundations, curbs, wiring, ductwork, piping, etc., as necessary for information and coordination
42 of all trades. These drawings shall be provided sufficiently in advance of installation to avoid delays and removal and
43 reworking of installed work, and so as to provide information to other trades when and as required. No work shall be
44 done until these drawings have been coordinated by the Contractor.

45
46 Submittals shall be checked before submission by technically qualified employees of Contractor for accuracy,
47 completeness and compliance with Contract requirement. **All submittals shall be accompanied by the "Submittal**
48 **Cover Form" provided at the end of this Section, signed by Contractor.**

49
50 Contractor shall submit complete lists or schedules of all proposed sub-contractors and material suppliers, and of all
51 proposed construction materials and equipment. Materials and equipment lists shall be complete with trade names
52 and/or catalog numbers of each item. Processing of the second and subsequent Certificate for Payment will be
53 withheld until substantial portions of these lists have been submitted.

54
55 Products furnished shall be essentially the standard product of the manufacturer. Where two or more units of the
56 same class of equipment are required, these units shall be products of a single manufacturer.

1 Products proposed by the Contractor shall be new except where specifically noted otherwise. Contractor(s) shall
2 provide products only from manufacturers who have published data showing compliance with specified requirements
3 or who certify in writing to such compliance (including laboratory and/or in-place testing, if applicable). All electrical
4 products shall be both labeled and listed, as defined above. **Prior to purchase of major materials, equipment or
5 systems, submit manufacturer's data to the A-E for review as hereinafter specified.**

6 Products of the specified type and for the specified application offered by the Contractor(s) for use on this Project
7 shall comply with the following requirements:

8
9 Product shall have had satisfactory performance in applications of similar character to that specified for a
10 period of at least three (3) years.

11
12 Product shall be from an established national or regional manufacturer. The A-E's experience with the
13 manufacturer on prior projects relative to product performance, technical support, etc. may be taken into
14 account to establish suitability of the offered product for this Project.

15
16 Product shall be provided through an authorized representative of the manufacturer. The representative
17 shall be capable of providing technical support relative to the installation, operation, and maintenance of the
18 product. The A-E's experience with the representative on prior projects relative to product performance,
19 technical support, etc. may be taken into account to establish suitability of the offered product for this
20 Project.

21
22 Repair parts and service for the product shall be available within twenty-four (24) hours of notice.

23
24 **The manufacturer and his authorized representative shall furnish satisfactory evidence in support of these
25 conditions when requested. The A-E's decision relative to the suitability and acceptability of any product is
26 final and acceptance of this limitation is implicitly acknowledged by the contractor and the manufacturer
27 and/or his representative offering the product for use on this Project.**

28
29 Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this
30 specification. Where a submitted item does not **comply fully** with each and every requirement of the specifications
31 the submittal shall clearly indicate such deviations by being marked "**NON-COMPLYING FEATURE.**" This indication
32 shall be applied to the submittals at the appropriate location in a color contrasting with the remainder of the submittal.
33 Additional information that might assist the Engineer in product evaluation may be included with the submittal. This
34 information should indicate how a specific non-complying feature is believed by the Contractor to meet the intent of
35 the specification.

36
37 **It is the Contractor's responsibility to demonstrate compliance with the specifications and to clearly
38 indicate any features that do not meet the specifications. It is not the Engineer's responsibility to
39 identify non-compliance.** Substantial non-compliance, as determined by the Engineer, is grounds for
40 rejection of the submittal. Discovery of non-complying features that have not been properly identified as
41 such on submittals may require, at any stage of construction, the removal and replacement of the non-
42 complying item(s).

43
44 The A-E will review shop drawings, manufacturer's data, and samples with reasonable promptness. This review is
45 only for general conformance with the design concept of the project and general compliance with the information
46 given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not
47 relieve contractor from compliance with the requirements of the plans and specifications. Approval of a specific item
48 shall not include approval of an assembly of which the item is a component. Contractor is responsible for dimensions
49 to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the
50 means, methods, techniques, sequences and procedures of construction; coordination of his or her Work with that of
51 all other trades; and for performing all work in a safe and satisfactory manner. The Contractor is responsible for any
52 delay caused by his failure to observe submittals requirements and the time for completion of his Contract will not be
53 extended because of such delays.

54
55 The A-E's submittals review stamp categories shall be interpreted as follows:

56
57 Reviewed: Fabrication and installation or erection may be undertaken.

58
59 Exceptions indicated, revise and proceed: Fabrication and installation of erection may be undertaken.
60 However, Contractor shall comply with all notes or corrections indicated.

1 Exceptions indicated, revise and re-submit: Neither fabrication, installation, nor erection shall be undertaken.
2 Re-submit corrected copies for review. Corrections shall be limited to items marked, except that changes
3 required in order to coordinate the corrections indicated shall be made. All changes, other than those
4 indicated, shall be called specifically to the A-E's attention.
5

6 Rejected, re-submit: Neither fabrication, installation, nor erection shall be undertaken. Revise entire
7 submission to comply with information given in the Contract Documents and re-submit.
8

9 Submittals returned to the Contractor with the A-E's "reviewed" or "exceptions indicated, revise and proceed" stamp
10 need not be resubmitted, except that corrected copies of "exceptions indicated, revise and proceed" submittals shall
11 be furnished for record when requested.
12

13 Submittals returned to the Contractor with the A-E's "revise and re-submit" or "rejected, re-submit" stamp shall be
14 corrected to comply with Contract requirements and re-submitted to the A-E for review. The Contractor shall direct
15 specific attention, in writing or on re-submitted shop drawings, product data or samples, to revisions other than those
16 requested by the A-E on previous submittals.
17

18 Shop drawings of work that involves more than one subcontractor shall be coordinated by the Contractor and
19 submitted to A-E under one cover. No items shall be fabricated, nor any portion thereof shipped to site, prior to
20 receipt by the Contractor of all applicable submittals, including manufacturer's data, samples and shop drawings
21 bearing the A-E's "reviewed" or "exceptions indicated" stamp only.
22

23 Manufacturer's data submitted as required by the technical specifications sections or requested by A-E shall consist
24 of four (4) copies of certificates, schedules, catalog cuts, manufacturer's specifications and installation instructions for
25 each type of product or material. Include maintenance recommendations, fire ratings and other reports when
26 applicable to show compliance with the Specifications. When catalog cuts are submitted, the specific item to be
27 considered shall be identified. Items that are not so identified will be returned to the Contractor without action.
28

29 Firestop Systems: Submit data on products. Provide manufacturer's certification of UL classification(s)
30 required, including copies of UL systems listings and schedule defining each UL system proposed and the
31 applicable type of penetration.
32

33 Access Units: Submit manufacturer's technical data and installation instructions for each type of access
34 door assembly, including setting drawings, templates, instructions and directions for installation of
35 anchorage devices.
36

37 Contractor shall submit for review any samples required by the technical specification sections or that may be
38 requested by the A-E.
39

40 With each electrical testing and compliance submittal, Contractor shall submit evidence of compliance that each
41 manufactured item or component of electrically-operated equipment and that each fabricated assembly of electrically
42 operated equipment furnished complies with the testing requirements.
43

44 **FIRE RATINGS**

47 Fire rating of walls and floors, as indicated on the Drawings, are for reference only. Refer to Architectural Drawings
48 for exact construction and fire ratings.
49

50 Where fire resistive insulation or other coverings have been applied to a structural element to obtain a fire rating and
51 this insulation or covering is removed or otherwise disturbed, the Contractor shall be responsible for restoring the
52 material to a condition that matches the original fire protective ability.
53

54 **USE OF BRAND NAMES**

57 Brand names, where scheduled as "basis of design," are to be considered for information purposes and are not
58 intended to be a product specification.
59

1 Where the Contractor proposes to use an item of equipment other than that indicated as basis of design that
2 may require redesign of the structure, partitions, foundations, piping, wiring, or any other part of the
3 mechanical, electrical, or architectural layout, all such redesign and all new drawings and detailing required
4 shall be prepared by the Contractor at his own expense and submitted for review by the A-E.
5

6 Where such deviation requires a different quantity and arrangement of ductwork, piping, wiring, raceway, or
7 equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such
8 ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and raceway,
9 and any other additional equipment required by the system, at no additional cost.
10

11 Brand names, where used as a product specification, are intended to denote the standard of quality required for the
12 particular material or product.
13

14 Where the term "equal" or "equivalent" is present, such specification does not restrict the Contractor to a
15 specific brand and equivalent products by other manufacturers may be acceptable. The term "equal" or
16 "equivalent" shall be interpreted to mean a material or product that is similar and equal in type, quality, size,
17 capacity, composition, finish, color, and other performance characteristics to the material or product
18 specified by brand name, and that, **in the opinion of the A-E**, is suitable for the same use and capable of
19 performing the same function as the material or product specified. **Proposed equivalent items must be**
20 **reviewed by the A-E before they are purchased or incorporated into the work.**
21
22

23 **EQUIPMENT SUBSTITUTIONS AND CHANGES/EXTRA COSTS FOR CHANGES IN BUILDING SERVICES**

24
25 Where the Contractor proposes to use an item of equipment other than that specified or detailed on the Drawings,
26 requiring any redesign of the structure, partitions, foundations, piping, wiring, or any other part of the mechanical,
27 electrical, or architectural layout, all such redesign and all new drawings and detailing required shall be prepared by
28 the Contractor at his own expense and submitted for review by the A-E.
29

30 Where such approved deviation requires a different quantity and arrangement of ductwork, piping, wiring, raceway, or
31 equipment from that specified or indicated on the Drawings, the Contractor shall furnish and install any such
32 ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and raceway, and any
33 other additional equipment required by the system, at no additional cost.
34

35 It is the responsibility of the Contractor to notify the A-E in all cases where the requirements of proposed equipment
36 differ from the requirements specified, shown, or implied on the Drawings or within the Specifications. **Failure of the**
37 **Contractor to notify the A-E shall not relieve the Contractor of the responsibility of providing compatible**
38 **equipment at no additional cost as described above.**
39
40

41 **OPERATION AND MAINTENANCE DATA**

42
43 For each Division of the Work, provide four (4) copies of Operating Manuals, Maintenance Manuals, and Test
44 Reports, bound in suitable covers, to the A-E at least two (2) weeks **prior** to the final inspection of the project.
45

46 Each manual shall include a cover sheet listing the following:
47

48 Project name and location.

49 Division of Work covered by the manual.

50 Contractor data, including name, address, phone and fax numbers, and service contact information (24-hour
51 number, email address, etc.)
52

53 Date of project completion.
54
55

56 Each manual shall include a table of contents.
57

58 Operating manual: Provide all relevant information needed for day-to-day operation and management of the building
59 systems. Include the following for each system:
60

1 System Description: Identify the areas of the building the system serves, the locations of performance
2 checkpoints, the expected performance readings at the design load conditions and, where applicable, at
3 part-load conditions. The system's operation during the day, night, and weekend, as well as seasonal start-
4 up and shutdown, safety devices and their function, control devices and their function, pollution control
5 devices, etc., also shall be described. The function of the controls for individual systems shall be described
6 alongside the description of the system function.
7 Operating Routines and Procedures: Identify activities associated with the normal operation of systems and
8 equipment. Operating checklists and operating logs shall be provided for each system and all performance
9 standards shall be identified.

10
11 Seasonal Start-Up and Shutdown: List seasonal start-up and shutdown procedures, including any
12 "mothballing" procedures required.

13
14 Special Procedures: Special procedures related to environmental control, health and safety, productive
15 work environment, etc., shall be codified.

16
17 Troubleshooting Procedures: This section shall include questionnaires and diagnostics to allow users to
18 isolate probable causes of operating problems in an efficient manner.

19
20 Maintenance manual: The maintenance manual shall be divided into two parts:

21
22 Part I shall contain information related to the equipment data sheets, nameplate data, operating data, etc.
23 Include the original purchase order number; date of purchase; name, address, and phone number of vendor;
24 and warranty information.

25
26 Part II shall support a maintenance program. The manual shall contain information prepared by the
27 equipment manufacturers, but shall be supplemented by information provided by the Contractor. Each item
28 of equipment shall be identified and an individual "Equipment Maintenance Sheet" shall be prepared for
29 each, with the following information:

30
31 Description each system and system component, consisting of easily read schematic drawings
32 showing all components, identified to match Part I data, that requires maintenance.

33
34 Recommended preventative and predictive maintenance procedures and their recommended
35 frequency of application for each system component.

36
37 Recommended list of spare parts with part numbers and place(s) they can be obtained.

38
39 Copy of manufacturer's Installation instructions for each component.

40
41 Any other information requested by the A/E to support the operation and maintenance of the
42 equipment.

43
44 Test reports: Provide copies of the test protocols used in the construction and commissioning of the systems.
45 Arrange data so as to allow the results of ensuing tests to be easily added.

46
47
48 **PART 2 - PRODUCTS**

49
50
51 **FIRESTOPPING SYSTEMS**

52
53 Firestop systems shall be used in locations including, but not limited to, the following:

54
55 Penetrations through fire resistance rated floor assemblies and roof assemblies (where required by code)
56 including both empty openings and openings containing penetrants.

57
58 Penetrations through fire resistance rated wall assemblies including both empty openings and openings
59 containing penetrants.

60

1 Membrane penetrations in fire resistance rated wall assemblies where items penetrate one side of the
2 barrier.

3
4 Membrane penetrations in fire resistance rated ceiling assemblies.

5
6 Systems or devices must be listed in the UL Fire Resistance Directory and must conform to construction type,
7 penetrant type, annular space requirements and fire rating involved in each separate instance. System must be
8 symmetrical for wall applications.

9
10 Systems or devices must be asbestos-free and all products must be from a single manufacturer.

11
12 Products must withstand the passage of cold smoke, either as an inherent property of the system or by the use of a
13 separate product included as part of the UL system or device, and designed to perform this function.

14
15 Cracks, Voids, or Holes Up to 4" Diameter: Putty or caulking, one-piece intumescent elastomer, non-corrosive to
16 metal, compatible with synthetic cable jackets, Listed, and capable of expanding 10 times when exposed to flame or
17 heat.

18
19 Openings 4" or Greater: Sealing system capable of passing 3-hour fire test in accordance with ASTM E-814,
20 consisting of wall wrap or liner, partitions, and end caps capable of expanding when exposed to temperatures of 250
21 to 350 deg. F (121 to 177 deg. C), Listed.

22
23 Wall Boxes:

24
25 Metallic boxes used in fire-rated walls or floors must be listed in the UL Fire Resistance Directory under
26 category CEYY.

27
28 Listed single and double gang metallic device and outlet boxes with metallic or nonmetallic cover plates may
29 be used in bearing and nonbearing wood stud and steel stud walls with ratings not exceeding 2 hours. The
30 metallic outlet or switch boxes shall be securely fastened to the studs and the opening in the wallboard
31 facing shall be cut so that the clearance between the box and the wallboard does not exceed 1/8 in. The
32 surface area of individual metallic outlet or switch boxes shall not exceed 16 sq. in. The aggregate surface
33 area of the boxes shall not exceed 100 sq. in. per 100 sq. ft. of wall surface.

34
35 Metallic boxes located on opposite sides of walls or partitions shall be separated by a minimum horizontal
36 distance of 24 in. This minimum separation distance between metallic boxes may be reduced when "Wall
37 Opening Protective Materials" listed in the UL Fire Resistance Directory under category CLIV are installed
38 according to the requirements of the Classification.

39
40 Metallic boxes shall not be installed on opposite sides of walls or partitions of staggered stud construction
41 unless "Wall Opening Protective Materials" are installed with the metallic boxes in accordance with
42 Classification requirements for the protective materials.

43 44 45 **WALL AND FLOOR ACCESS DOORS**

46
47 Where floors, walls and ceilings must be penetrated for access to engineering work, provide types of access doors
48 indicated, including floor doors if any. Furnish sizes indicated or, where not otherwise indicated, furnish 24" x 24"
49 panels. Furnish manufacturer's complete units, of type recommended for application in indicated substrate
50 construction, in each case, complete with anchorages and hardware.

51
52 Except as otherwise indicated, fabricate wall/ceiling door units of welded steel construction with welds ground
53 smooth, 16-gage frames and 14-gage flush panel doors, 175 deg. swing with concealed spring hinges, flush
54 screw-driver-operated cam locks, factory-applied rust-inhibitive prime-coat paint finish.

55
56 Provide rated access doors where installed in fire resistance rated floor and wall assemblies to meet fire rating.

57
58

1
2
3
4 **PART 3 – EXECUTION**
5

6 **GENERAL**

7 Comply with NFPA 241, *Standard for Safeguarding Construction, Alterations, and Demolition Operations*; ANSI A10
8 Series standards for *Safety Requirements for Construction and Demolition*; and Chapter 14 of the *North Carolina*
9 *State Building Code: Fire Code*.

10
11 **FIRE PROTECTION DURING CONSTRUCTION**
12

13 Building contents and all elements of new and/or existing construction must be thoroughly protected from
14 construction procedures that produce sparks, flames, or excessive heat. Such procedures include, but are not limited
15 to, welding, soldering, flame-cutting, using grinders or metal cutting saws, and heating of work spaces. Contractor
16 shall maintain fire watch and/or portable fire-suppression devices, as required, during these operations.

17
18 The Contractor shall develop, provide, and post a written plan in compliance with NFPA 241 and Chapter 14 of the
19 *North Carolina State Building Code: Fire Code*.

20
21 Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs
22 with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures
23 required to prevent fires and how to deal with them if they occur.

24
25 Provide and maintain portable, UL rated fire extinguishers with class and extinguishing agent as required by locations
26 and classes of fire exposures. Comply with NFPA 10 *Standard for Portable Fire Extinguishers*. Locate fire
27 extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each
28 floor or area at or near each usable stairwell.

29
30
31 **SECURITY AND SAFETY DURING CONSTRUCTION**
32

33 Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting
34 structurally adequate barricades, including warning signs and lighting.

35
36 Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by
37 authorities having jurisdiction.

38
39 Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from
40 exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight
41 enclosure for building exterior. Where heating or cooling is needed and permanent enclosure is incomplete, insulate
42 temporary enclosures.

43
44
45 **MOISTURE AND MOLD CONTROL DURING CONSTRUCTION**
46

47 Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and
48 exposure and to airborne mold spores, protect as follows:

49
50 Protect porous materials from water damage.
51 Protect stored and installed material from flowing or standing water.

52
53 Keep porous and organic materials from coming into prolonged contact with concrete.

54
55 Keep roof, wall, and/or openings covered or dammed.

56
57 Partially Enclosed Construction Phase: After installation of weather barriers, but before full enclosure and
58 conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores,
59 protect as follows:
60
61

- 1 Do not load or install porous materials or components, or items with high organic content, into partially
2 enclosed building.
3
4 Keep interior spaces reasonably clean and protected from water damage.
5
6 Periodically collect and remove waste containing cellulose or other organic matter.
7
8 Discard or replace water-damaged material.
9
10 Do not install material that is wet.
11
12 Discard, replace, or clean stored or installed material that begins to grow mold.
13
14 Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the
15 material in drywall or other interior finishes.
16
17 Controlled Construction Phase of Construction: After completing and sealing of the building enclosure, maintain as
18 follows:
19
20 Control moisture and humidity inside building by maintaining effective dry-in conditions.
21
22 Use **temporary** HVAC units or system to control humidity.
23
24 Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water
25 limits.
26
27 Hygroscopic materials that may support mold growth that become wet during the course of construction and
28 remain wet for 48 hours are considered defective and must be replaced.
29
30

DUST AND CONTAMINATION CONTROL DURING CONSTRUCTION

- 31
32
33 Prevent dust, fumes, and odors from entering occupied areas or areas in which construction work is more advanced
34
35 Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by
36 Owner from fumes and noise. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each
37 side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls.
38 Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
39
40 Maintain negative air pressure within the work area using HEPA-equipped air-filtration units, starting with
41 commencement of temporary partition construction, and continuing until removal of temporary partitions is
42 complete.
43
44 Use vacuum collection attachments on dust-producing equipment. Isolate limited work areas using portable dust-
45 containment devices.
46
47 Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
48
49 Coordinate general construction activities with the work of Divisions 21-28 to avoid contamination and/or degradation
50 of building engineered systems by dust, over-spray of insulation or paint, etc. **Costs for the cleaning and/or**
51 **component replacement of engineered systems required by contamination and/or degradation by general**
52 **construction activities shall be assigned to the General Contractor.**
53
54

TEMPORARY HVAC SYSTEMS USE DURING CONSTRUCTION

- 55
56
57 **The use of permanent HVAC systems to support construction activities is prohibited.** The need for heating,
58 cooling, dehumidification, and/or ventilation during construction shall be met via use of temporary HVAC units or
59 systems as follows:
60
61

1 Heating: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space
2 thermostatic control. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type
3 heating units is prohibited.

4
5 Cooling: Provide modular, portable stand-alone direct expansion cooling units with condensers vented to the
6 outdoors.

7
8 Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing
9 or drying of completed installations or for protecting installed construction from adverse effects of high
10 humidity. Select equipment that will not have a harmful effect on completed installations or elements being
11 installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy
12 consumption.

13 14 **COOPERATION WITH OTHER TRADES**

15
16
17 The Contractor shall give full cooperation to other trades and shall furnish any and all information necessary to permit
18 the work of other trades. Information to be provided by the Contractor includes, but is not limited to templates,
19 patterns, setting plans, and shop details as may be necessary for the proper installation of work and for the purpose
20 of coordinating adjacent work. Information required by other trades shall be provided in a timely manner and shall be
21 sufficient to allow the work of such other trades to proceed with the least possible interference or delay.

22
23 Where the work of the Contractor will be installed in close proximity to, or may interfere with work of other trades, the
24 Contractor shall assist in working out space conditions to make a satisfactory adjustment. **If the Contractor installs
25 his work before coordination with other trades, he shall make the necessary changes in his work to correct
26 the condition without extra charge.**

27 28 29 **FIRESTOPPING**

30
31 Installer should be experienced in installing or applying similar systems, plus: be acceptable to or licensed by
32 manufacturer, state or local authority where applicable; have at least five years experience; and have successfully
33 completed at least five comparable projects using this system.

34
35 Firestop systems or devices installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested
36 assemblies that provide a fire rating equal to that of construction being penetrated.

37
38 Install only after substrate penetrations and supporting brackets have been installed. Do not install firestopping when
39 ambient or substrate temperatures are outside limits permitted by manufacturers or when substrates are wet. Where
40 floor openings without penetrating items are more than 4 inches wide and subject to traffic or loading, install
41 firestopping materials capable of supporting same loading as floor. Protect materials on surfaces subject to traffic.

42 43 44 **SMOKE-RESISTIVE SYSTEMS**

45
46 The space around items penetrating non-fire rated walls and floors shall be filled with an approved material to limit
47 the free passage of smoke, heat and flame in locations including, but not limited to, the following:

48
49 Penetrations through non-rated floors including both empty openings and openings containing penetrants.

50
51 Penetrations through non-rated smoke partitions and wall assemblies including both empty openings and
52 openings containing penetrants.

53 54 55 **WALL AND FLOOR ACCESS DOORS**

56
57 Comply with manufacturer's instructions for installation of access doors, floor doors, and removable access plates.

58
59 Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to
60 adjacent finish surfaces.

1 Adjust hardware and panels after installation for proper operation.

2
3 Remove or replace panels or frames that are warped, bowed, or otherwise damaged.

4
5
6 **PATCHING**

7
8 Repair, patching, and finishing of walls, floors, and/or ceilings affected by demolition, cutting after installation of new
9 work, etc. shall be done by technicians skilled in the applicable trades and shall match surrounding or adjoining
10 materials in composition, texture, color, and finish.

11
12
13 **CONTRACTOR AS-BUILT DRAWINGS**

14
15 Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and
16 revised drawings as modifications are issued.

17
18 Mark record prints to show the actual installation where installation varies from that shown originally. Require
19 individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity,
20 to provide information for preparation of corresponding marked-up record prints.

21
22 Give particular attention to information on concealed elements that would be difficult to identify or measure
23 and record later.

24
25 Accurately record information in an acceptable drawing technique.

26
27 Record data as soon as possible after obtaining it.

28
29 Record and check the markup before enclosing concealed installations.

30
31 Cross-reference record prints to corresponding archive photographic documentation.

32
33 Types of items requiring marking include, but are not limited to, the following:

34
35 Dimensional changes.

36
37 Revisions to details.

38
39 Locations and depths of underground utilities.

40
41 Revisions to routing of piping and conduits.

42
43 Revisions to electrical circuitry.

44
45 Actual equipment locations.

46
47 Duct size and routing.

48
49 Locations of concealed internal utilities.

50
51 Additional information that was either shown schematically or omitted from original Drawings.

52
53 Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar
54 identification, where applicable.

55
56 Submit Contractor As-built Drawings to A/E for review **at least two (2) weeks prior to Project final inspection.**

57
58
59 **END SECTION 019913**

SUBMITTAL COVER FORM

PROJECT: Miles Annas Post Office Renovation
Appalachian State University

PROJECT NO.: 2023-00660

TO: SALAS O'BRIEN
1620 Midtown Place
Raleigh, NC 27609

FROM: _____

_____ CONTRACTOR _____ SUBCONTRACTOR

We submit for your consideration the following product for the above project:

SPECIFICATION SECTION	SPECIFICATION PARAGRAPH	DESCRIPTION
_____	_____	_____

TYPE OF SUBMITTAL:

- _____ Specified Brand Product
- _____ Proposed Equivalent Product to Specified Brand
- _____ Product Meeting Performance Specification (No Brand Specified)

We warrant the following:

- a. We have personally investigated the proposed product, and determined that it is equal in all respects to that specified and/or performance specification requirements;
- b. We will provide the specified guarantee for this product;
- c. We will coordinate installation of this product into the work, making such changes as may be required for the work to be complete in all respects;
- d. We have clearly indicated by marking as "Non-Complying Feature" each and every requirement of the Specifications that this product does not meet;
- e. And, we waive all claims for additional costs related to this product which subsequently become apparent.

Attached hereto are complete technical data, including applicable laboratory reports, to demonstrate compliance with project requirements.

SUBMITTED BY:

SIGNATURE

DATE

SUBMITTAL REVIEW

(SAMPLE FORM - ORIGINAL WITH COMMENTS WILL BE ATTACHED TO
SUBMITTAL BY A/E)

PROJECT:

PROJECT #:

SUBMITTAL ID#:

SPECIFICATION PARAGRAPH:

DESCRIPTION:

Submittal has been reviewed only for conformance with design intent of the contract documents. See Section 019913 "GENERAL REQUIREMENTS FOR ENGINEERED WORK" for complete definition of Submittal Review.

- Reviewed
- Exceptions Noted - Revise & Proceed
- Exceptions Noted - Revise & Resubmit
- Rejected

DATE:

BY:

REVIEW COMMENTS:

THESE COMMENTS SHALL NOT BE REMOVED FROM THIS DOCUMENT

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Demolition and removal of selected portions of building.
- B. Salvage of existing items to be salvaged or reused

1.2 MATERIAL OWNERSHIP

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

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of selective demolition activities with starting and ending dates for each activity.
- C. Predemolition photographs or video. Prior to commencing Work, document existing conditions with photographs, highlighting areas to be modified.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.5 CLOSEOUT SUBMITTALS

- A. Inventory of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.7 FIELD CONDITIONS

- A. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner.
- C. Storage or sale of removed items or materials on-site is not permitted.

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

2.2 SELECTIVE DEMOLITION SCHEDULE

- A. Remove, Salvage and Reinstall items, as indicated on Drawings, including:
 - 1. Faculty Mailboxes
 - 2. Mail Drop Boxes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.

- b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 4. Maintain fire watch during and for at least 12 hours after flame-cutting operations.
 - 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 6. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Relocation of existing furniture and equipment.
 - 1. Furniture and equipment indicated to be relocated are to remain in building unless otherwise agreed to with Owner.
 - 2. Relocate and protect furniture and equipment, throughout construction.
 - 3. Clean furniture and equipment at end of construction and prior to placing as directed by Owner.
 - 4. Relocate furniture and equipment prior to commencement of Work.

- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

- B. Burning: Do not burn demolished materials.

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

END OF SECTION

SECTION 03 54 13

GYPSUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Self-leveling, gypsum cement underlayment for patching of concrete slabs

1.2 ACTION SUBMITTALS

- A. Product Data
- B. Shop Drawings: Identify locations and average depths of underlayment.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's submittal indicating compatibility of underlayment and floor covering assemblies
- B. Manufacturer's installation instructions.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - 1. Place gypsum cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 - PRODUCTS

2.1 GYPSUM CEMENT UNDERLAYMENTS

- A. Gypsum Cement Underlayment: Self-leveling, gypsum cement product that can be applied in minimum uniform thickness of 1/8 inch to match adjacent floor elevations.
 - 1. Basis of Design: Maxxon Corporation.; Gyp-Crete 2000/3.2 or a comparable product by one of the following
 - a. Hacker Industries, Inc.
 - b. USG Corporation
 - 2. Thickness: 1 inch unless otherwise indicated.
 - 3. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C219.
 - 4. Compressive Strength: Not less than 3000 psi at 28 days when tested according to ASTM C472.
 - 5. Final Set time: 60 – 90 minutes
 - 6. Dry Density with aggregate: not less than 120 lbs/cf
 - 7. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
 - 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F.

- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.

3.2 INSTALLATION

- A. Mix and install underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment installation and for time period after installation recommended in writing by manufacturer.
 - 2. Coordinate installation of components to provide optimum adhesion to substrate and between coats.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Install underlayment to produce uniform, level surface, in thickness indicated on drawings.
 - 1. Install a final layer without aggregate to product surface.
 - 2. Feather edges to match adjacent floor elevations.
- C. Cure underlayment according to manufacturer's written instructions. Prevent contamination during installation and curing processes.
- D. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- E. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.3 INSTALLATION TOLERANCES

- A. Finish and measure surface, so gap at any point between gypsum cement underlayment surface and an unleveled, freestanding, 10-foot-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

3.4 PROTECTION

- A. Protect underlayment until covered with finished flooring.

END OF SECTION

SECTION 05 4000

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior non-load-bearing wall framing.
- B. Related Requirements:
 - 1. Section 05 5000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
 - 2. Section 09 2216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Cold-formed steel framing materials.
 - 2. Interior non-load-bearing wall framing.
 - 3. Single deflection track.
 - 4. Post-installed anchors.
 - 5. Power-actuated anchors.
- B. Shop Drawings:
 - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated Design Submittal: For cold-formed steel framing beyond the scope of Division 9 metal stud specifications to include shop drawings signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Product Certificates: For each type of code-compliance certification for studs and tracks.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Miscellaneous structural clips and accessories.
- D. Research Reports:
 - 1. For nonstandard cold-formed steel framing, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect and store cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling as required in AISI S202.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers shall provide cold-formed steel components complying with the provisions of AISI S201 unless more stringent requirements are indicated elsewhere.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on Drawings.

2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1 inch.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing complies with AISI S100 and AISI S200 and ASTM C955, Section 8.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Framing Members, General: Comply with AISI S200 and ASTM C955, Section 8 for conditions indicated.
- B. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
1. Grade: As required by structural performance.
 2. Coating: G90 or equivalent.
- C.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch.
 2. Minimum Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: Matching steel studs.
 2. Minimum Flange Width: 1-1/4 inches.
- C. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: As required for structural performance.

2. Flange Width: 1 inch plus the design gap.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Anchor clips.
 4. Gusset plates.
 5. Stud kickers and knee braces.
 6. Hole-reinforcing plates.
 7. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC308 as appropriate for the substrate.
 1. Uses: Securing cold-formed steel framing to structure.
 2. Type: adhesive anchor.
 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.
- B. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing shall be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by screw fastening. Wire tying of framing members is not permitted.
 - a. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 INSTALLATION OF INTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: 16 inches maximum.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing agency will report test results promptly and in writing to Contractor and Architect.
- C. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 4000

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Miscellaneous steel framing and supports.
- B. Miscellaneous steel trim.
- C. Loose bearing and leveling plates.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- F. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, structural steel, Grade 33; 0.0677-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
- G. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- H. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- I. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.

2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

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

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.6 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim.

2.7 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.8 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls.

2.9 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.10 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer.

- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets.
 - 2. Compact plastic laminate countertops and wall panels
 - 3. Wood Trim

1.2 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
- C. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.
- D. MDF: ANSI A208.2, Grade 130.
- E. Particleboard: ANSI A208.1

2.2 MANUFACTURERS

- A. Manufacturers listed in the Finish Legend are as a Basis of Design for physical, description, performance and aesthetic characteristics and not in an effort to limit competition. Provide physical samples to compare aesthetic characteristics in comparison with the basis of design.

2.3 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Architectural Woodwork Standards Grade: Custom.

- C. Type of Construction: Face frame.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: ISO 4586-3, grades as indicated or if not indicated, as required by quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved substitution:
 - a. Abet Laminati Inc.
 - b. Formica Corporation.
 - c. Lamin-Art, Inc.
 - d. Wilsonart LLC.
- F. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS.
 - 3. Edges: Grade HGS or PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
 - 4. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.
- G. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 8 to 13 percent.
- H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, ISO 4586-3, Grade BKL.
- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by laminate manufacturer's designations.
 - 2. Plastic-laminate clad protective panels

2.4 HARDWARE AND ACCESSORIES

- A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.
- B. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- C. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- D. Drawer Slides: BHMA A156.9.
 - 1. Grade 1 and Grade 2: Side mounted.
 - a. Type: Full extension.
 - b. Material: Zinc-plated steel with polymer rollers.
 - 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 - 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 - 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 - 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.

- A. Catches (Trash Drop): Push-in magnetic catches, ANSI/BHMA A156.9, B03131.
- B. Door and Drawer Silencers: BHMA A156.16, L03011.
- C. Labels: Applied Graphic indicating “Trash” or “Recycle” as indicated.
- D. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Color: As selected by Architect.
- E. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Satin Stainless Steel: BHMA 630.
- F. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 COMPACT LAMINATE COUNTERTOP

- A. Basis of Design: Refer to Finish Legend in Drawings

2.6 WOOD TRIM FOR LOCKERS AND MAILBOXES

- A. Characteristics:
 - 1. Species: Poplar
 - 2. Size: ½ inch thick by 4 inch wide

2.7 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Waste Container for Millwork Trash Drop:
 - 1. Basis of Design: Rubbermaid FG395800GRAY or comparable product by
 - a. Global Industrial
 - 2. Characteristics
 - a. Size: 35 gallon square container
 - 1) Top: 19.5 inches by 19.5 inches
 - 2) Height: 27.6 inches
 - 3) No handles

2.8 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to

produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install woodwork and finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.2 INSTALLATION OF WOOD TRIM AT LOCKERS AND MAILBOXES

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 - 1. Vertical Applications: Install single, continuous board length
 - 2. Horizontal Applications: Install in longest length possible, with no board being less than 48 inches in length.
 - 3. Joints:
 - a. Miter corner joints
 - b. Scarf end-to-end joints
 - 4. Install trim after completion of Mailboxes and Lockers..
 - 5. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 - 6. Fasten to prevent movement or warping.
 - 7. Countersink fastener heads on exposed carpentry work and fill holes.
 - 8. Field Finish

3.3 CASEWORK INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Urethane joint sealants.
- B. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.
- D. Field-adhesion-test reports.
- E. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.

3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 JOINT SEALANTS

- A. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.
- B. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Tremco Incorporated.

2.3 JOINT-SEALANT BACKING

- A. 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.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. BASF Corporation.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.4 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.
- 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 to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind 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.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. 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.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry walls and partitions.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
 - a. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Hollow Metal Frames

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each frame type.
 - 2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- C. Product Schedule: For hollow-metal frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fleming Door Products Ltd.; Assa Abloy Group Company.
 - 2. Mesker Door Inc.
 - 3. Republic Doors and Frames.
 - 4. Steelcraft; an Allegion brand.

2.2 INTERIOR STANDARD STEEL FRAMES

- A. Construct hollow-metal frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level A.
 - 1. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Construction: Full profile welded.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

2.5 FABRICATION

- A. require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal frames for hardware.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

- B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.3 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Five-ply flush wood doors for opaque finish.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including the following:
 - 1. Door core materials and construction.
 - 2. Door edge construction
 - 3. Door face type and characteristics.
 - 4. Factory-machining criteria.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:
 - 1. Door schedule indicating door location, type, size, and swing.
 - 2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
 - 3. Details of frame for each frame type, including dimensions and profile.
 - 4. Dimensions and locations of blocking for hardware attachment.
 - 5. Clearances and undercuts.
 - 6. Requirements for veneer matching.

1.3 WARRANTY

- A. When warranties are required, verify with Owner's counsel that special warranties stated in this article are not less than remedies available to Owner under prevailing local laws.
 - 1. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 2. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with "Architectural Woodwork Standards."
- B. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 SOLID-CORE, FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eggers Industries.
 - b. Lambton Doors.
 - c. Masonite Architectural.
 - d. Oshkosh Door Company.
 - 2. Architectural Woodwork Standards Grade: Custom.
 - 3. Faces: Hardboard or MDF.
 - a. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
 - b. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
- B. Exposed Vertical and Top Edges:
 - 1. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-1 particleboard.
 - 1) Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - b. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
 - 2. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.3 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

2.4 FACTORY PRIMING

- A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099100 - Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Job-Fitted Doors:
 - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.

2. Machine doors for hardware.
3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
4. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

3.2 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.

END OF SECTION

SECTION 08 33 13

COILING COUNTER DOORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Counter door assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 2. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 COUNTER DOOR ASSEMBLY

- A. Basis of Design: Mini RollUp Shutter RF40 by Dynamic Closures or comparable product by one of the following:
 - 1. Cookson Company.
 - 2. Cornell.
 - 3. McKeon Rolling Steel Door Company, Inc.
 - 4. Overhead Door Corporation
- B. Door Curtain Slats: Foamed Filled Aluminum Slat, 1.57 inch center-to-center height.
- C. Bottom Bar: Manufacturer's heavy-duty extruded, aluminum. 1.18 inch wide by 3 inch high
- D. Curtain Jamb Guides: Extruded Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- E. Hood: Match curtain material and finish.
 - 1. Mounting: Face of wall.
- F. Locking Devices: Standard Mortise lock with thumbturn

- G. Manual Door Operator: Push-up operation
- H. Curtain Accessories: Equip door with push/pull handles and pull-down strap.
- I. Door Finish:
 - 1. Baked-Enamel or Powder-Coated Finish: Color to be selected from Manufacturer's standard colors.
 - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.2 DOOR CURTAIN MATERIALS AND FABRICATION

- A. Door Curtains: Fabricate coiling counter door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
- B. Curtain Jamb Guides: Aluminum extrusion of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.4 COUNTER DOOR ACCESSORIES

- A. Integral Metal Sill: Fabricate sills as integral part of frame assembly of Type 304 stainless steel in manufacturer's standard thickness with ASTM A480/A480M No. 4 finish.

2.5 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

2.6 MANUAL DOOR OPERATORS

- A. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mechanical door hardware for swinging doors

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
- B. Keying Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Door hardware schedule.
- C. Keying schedule.
- D. Sample warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
 - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Final Completion unless otherwise indicated below:
 - a. Manual Closers: 10 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the ICC A117.1

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
- B. Anti-friction butt hinges shall be used on any door with a closer or overhead stop. Heavy weight hinges shall be used in accordance with manufacture's recommendations for door weight.
- C. Shall be full mortised unless indicated in hardware sets.
- D. Number of Hinges: Two hinges for every door up to 60". One additional hinge for each additional 30" of door height.
- E. Butt Hinge Sizing: Shall meet manufactures requirements for size based on door weight and width. Doors 37" and greater in width are to receive 5" tall hinges.

2.1 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Backset: 2-3/4 inches unless otherwise indicated.
- C. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

2.2 AUXILIARY LOCKS

- A. Bored Auxiliary Locks: BHMA A156.36: Grade 1; with strike that suits frame. Conform to ASU Standards

2.3 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder to match existing ASU Standard – Sargent keyway.
- B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 6 construction master keys.

2.4 KEYING

- A. Keys: Nickel silver.
 - 1. Stamping: Permanently inscribe each key blank with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.5 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; aluminum unless otherwise indicated.

2.6 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide multi-sized closers, adjustable to meet field conditions and requirements for opening force.
- B. Stop arms:
 - 1. Provide soffit plate for parallel arm applications using aluminum frames with blade stops or snap on stops.
 - 2. Manufacturers: ASU Standard Medeco KeyMark 4 or comparable product by
 - a. Schlage
 - b. Norton
 - c. Dormakaba

2.7 MECHANICAL STOPS AND HOLDERS

- A. Wall- Mounted Stops: BHMA A156.16.

2.8 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick aluminum; with manufacturer's standard machine or self-tapping screw fasteners.

2.9 FINISHES

- A. Provide finishes complying with BHMA A156.18 to match existing hardware to remain.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building areas during construction period.

- E. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

3.2 ADJUSTING

- A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.3 DOOR HARDWARE SCHEDULE

Door #5

Hinges
Lever Lockset with Storage Room Function
Surface Closer
Kickplate
Wall Stop
Silencers

Door #6 and Door #7

Hinges
Lever Lockset with Office Function
Surface Closer
Kickplate
Wall Stop
Silencers

END OF SECTION

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Non-load-bearing steel framing systems for interior partitions.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Delegated-Design Submittal: For framing and bracing, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Evaluation reports for embossed, high-strength steel studs and tracks, post-installed anchors and power-actuated fasteners.

1.4 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design framing, including bracing and attachment to building construction.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G60, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
 - 1. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection
 - 2. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Steel Thickness: 0.0329 inch.
- E. Hat-Shaped, Rigid Furring Channels: ASTM C645.
 - 1. Minimum Base-Steel Thickness: 0.0329 inch.
 - 2. Depth: 7/8 inch.
- F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- E. Z-Shaped Furring Members:
1. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 2. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior gypsum board.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. CertainTeed Gypsum.
 2. Georgia-Pacific Gypsum LLC.
 3. National Gypsum Company.
 4. USG Corporation.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or a high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.5 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
- D. Metal Trim and Reveals
 1. Manufacturer: Basis of Design: Fry Reglet, or comparable product by one of the following:
 - a. Pittcon
 - b. Gordon Inc.
 2. Straight Reveal:
 - a. Basis of Design: Fry Reglet Reveal, DRM 625-50
 - b. Material: Aluminum
 - c. Depth: 5/8 inch
 - d. Width: 1/2 inch, unless otherwise noted.
 - e. Finish: Clear Anodized unless otherwise indicated.
 3. Edge Trim for horizontal to vertical intersection
 - a. Basis of Design: Fry Reglet "W" Reveal, DRWT 75-75
 - b. Material: Aluminum
 - c. Depth: 3/4 inch
 - d. Width: 3/4 inch, unless otherwise noted.
 - e. Finish: Clear Anodized unless otherwise indicated.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

- E. Prefill open joints and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - 4. Level 5: In areas where walls longer than 20 feet have wall light sconces or natural daylight. In areas where wall covering is the exposed finish material.

3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
- C. Delegated-Design Submittal: For seismic restraints for ceiling systems.
 - 1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research reports.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size panels equal to 3 percent of quantity installed of each type of panel

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Class A according to ASTM E1264.

2.2 MANUFACTURER

- A. Basis-of-Design: Refer to Interior Finish Legend on Drawings
 - 1. Manufacturers with comparable products include
 - a. CertainTeed Corporation; Saint-Gobain North America.
 - b. Rockfon (Rockwool International).
 - c. USG Corporation.

2.3 CHARACTERISTICS (ACT)

- A. Acoustical Ceiling Panel
 - 1. ASTM E1264 Classification: Type III, Form 1, Pattern E I
 - 2. Thickness: 7/8 inch
 - 3. Edges: Beveled Tegular
 - 4. NRC: 0.75
 - 5. CAC: 35
 - 6. Light Reflectance 0.85
 - 7. Modular Size: 24 by 24 inches
- B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M.
 - 1. Narrow-Face, Capped, Double-Web Steel: Intermediate duty, to match existing.
 - 2. Attachment Devices: Post-installed expansion.
 - 3. Hold-down clips.

2.4 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Hold-Down Clips: Manufacturer's standard hold-down.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

3.2 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M and manufacturer's written instructions.
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 - 3. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.

END OF SECTION

SECTION 09 54 26

SUSPENDED WOOD GRILLE CEILINGS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes linear wood panels and suspension systems for ceilings.
- B. Work of this section is affected by one or more Alternates.

1.2 COORDINATION

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed finish.
- C. Coordination Drawings: Drawn to scale and coordinating and showing the following:
 - 1. Linear pattern.
 - 2. Joint pattern.
 - 3. Ceiling suspension members.
 - 4. Method of attaching hangers to building structure.
 - 5. Ceiling-mounted items.
 - 6. Ceiling perimeter and penetrations through ceiling; trim and moldings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Single-Source Responsibility: Provide ceiling grille units and grid components by a single manufacturer.

- C. Coordination of Work: Coordinate ceiling work with related work including, but not limited to:
 - 1. Light fixtures.
 - 2. Mechanical systems.
 - 3. Electrical systems.
 - 4. Fire protection sprinkler system.

1.6 MAINTENANCE

- A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
 - 1. Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.
 - 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 PROJECT CONDITIONS

- A. Prior to installation, the wood veneer ceiling materials are required to reach room temperature and have stabilized moisture content for a minimum of 72 hours.
- B. Do not install the wood veneer grilles in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space.
- C. As interior finish products, the wood veneer grilles are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

2.3 WOOD GRILLE SYSTEMS MANUFACTURERS

- A. Ceiling Grilles:
 - 1. Basis-of-Design: Armstrong Woodworks Grille- Forte Solid Ceiling Panels as indicated on Finish Schedule or a comparable product by one of the following:
 - a. 9-Wood
 - b. Rulon

2.4 METAL SUSPENSION SYSTEMS

- A. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635/C 635M requirements.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated.
 - 1. Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC service condition (mild).
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- C. Wire Hangers, Braces, and Ties: Zinc-Coated Carbon-Steel Wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper
 - 1. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung is less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- D. Carriers: Factory finished with matte-black baked finish.
 - 1. Main Carriers: Steel, not less than 0.0209-inch nominal thickness, cold-rolled sheet, with factory-applied protective coating, complying with ASTM C 635/C 635M.
 - 2. Expansion Carriers: Manufacturer's standard carriers allowing for irregularities or other unusual space conditions.
- E. Carrier Splices: Same metal, profile, and finish as for carriers.
- F. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals and spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not proceed with installation until wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.
- B. Prior to beginning work on HVAC system, make sure supply air is properly filtered and building interior is free of construction dust.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of ceiling grille units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate grille layout with mechanical and electrical fixtures.

3.3 INSTALLATION

- A. Comply with ASTM C 636/C 636M and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required, install trapezes or equivalent devices.
 - 4. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 6. Do not attach hangers to steel deck tabs or to steel roof deck.
- C. Install edge moldings and trim of type indicated at perimeter of linear wood grille ceiling area and where necessary to conceal edges and ends of linear wood grilles.
 - 1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
- D. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Cut linear wood grilles for accurate fit at borders and at interruptions and penetrations by other work through ceilings.
- F. Install linear wood grilles in coordination with suspension system and exposed moldings and trim.

3.4 ADJUSTING AND CLEANING

- A. Replace damaged and broken grilles.
- B. Clean exposed surfaces of ceilings grilles, including trim, edge moldings, and suspension members.
 - 1. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
 - 2. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Resilient Plank Flooring (RF01)
- B. Resilient Tile Flooring (RF02)
- C. Resilient Base and Accessories

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish a minimum of 3 percent or one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Verify flooring products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 RESILIENT PLANK FLOORING (RF01)

- A. Refer to Finish Legend on Drawings for Basis of Design or comparable product by one of the following:
 - 1. Mannington Commercial
 - 2. Shaw Contract
 - 3. Forbo

- B. Characteristics:
 - 1. PVC Free
 - 2. Integral Cushioned backing
 - 3. Wood Look Plank, to coordinate with Real Wood Wall Covering
 - 4. Plank Size: 7 by 48 inches
 - 5. Wear Layer: 20 mil
 - 6. Overall Thickness: 4.5 mm
 - 7. Edge Profile: Micro Bevel with Tongue and Groove
 - 8. Installation: Glue Down

2.3 RESILIENT TILE FLOORING (RF02) VINYL COMPOSITION TILE

- A. Refer to Finish Legend on Drawings for Basis of Design, or a comparable product by one of the following
 - 1. Tarkett Commercial
 - 2. American Biltrite
- B. Tile Standard: ASTM F1066, Class 2, through pattern.
 - 1. Wearing Surface: Smooth.
 - 2. Thickness: 0.125 inch.
 - 3. Size: 12 by 12 inches.

2.4 RUBBER WALL BASE (RB01) – MILLWORK BASE

- A. Refer to Finish Legend on Drawings for Basis of Design, or a comparable product by one of the following
 - 1. Roppe
 - 2. Coveworks
- B. Characteristics
 - 1. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - a. Style and Color: Millwork profile as indicated in Interior Finish Legend on Drawings
 - 2. Height: 4.25 inches.
 - 3. Outside Corners: Job formed, mitered
 - 4. Inside Corners: Job formed, mitered

2.5 VINYL WALL BASE (VB01)

- A. Refer to Finish Legend on Drawings for Basis of Design
- B. Characteristics
 - 1. Product Standard: ASTM F 1861, Type TV (vinyl, thermoplastic)
 - 2. Group I (solid, homogeneous).
 - 3. Style and Location:
 - a. Style B, Cove: Provide in areas with resilient floor coverings.
 - 4. Thickness: 0.125 inch.
 - 5. Height: 4 inches.
 - 6. Lengths: Coils in manufacturer's standard length.
- C. Corners: Job formed
- D. Colors: As selected from manufacturer full range

2.6 TRIM AND TRANSITION

- A. Metal Powdercoated trim edge at carpet insets.
- B. Resilient transition edges for the following
 1. ½ inch thick tile to carpet tile
 2. ½ inch thick tile to VCT
 3. VCT to Carpet tile
 4. Resilient Plank Flooring to Carpet
 5. Resilient Plank Flooring to VCT

2.7 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to resilient product manufacturer's written instructions to ensure adhesion
- B. Concrete Substrates for Resilient Accessories: Prepare horizontal surfaces according to ASTM F710.
 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. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 FLOOR INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 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 practical 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.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter corners to minimize open joints.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Modular carpet tile

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For carpet installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each exposed product and for each color and texture required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Final Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT)

- A. Refer to Finish Legend on Drawings for Basis of Design or comparable product by one of the following:
 - 1. Mannington Commercial
 - 2. Shaw Contract
 - 3. Forbo

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

3.2 INSTALLATION - GENERAL

- A. General: Comply with CRI's "CRI Carpet Installation Standard," and carpet manufacturer written installation procedures.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

3.3 INSTALLATION

- A. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- B. Install pattern parallel to walls and borders.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 72 00

WALL COVERINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wood Veneer Wallcovering
- B. Custom Graphic Wallcovering
- C. Work of this Section is affected by an Allowance and Unit Price

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For wood veneer wallcovering.
- C. Proof: Full color Proof for Custom Graphic Wallcovering
- D. Manufacturer Installation Instructions.
- E. List of projects for each applicator installing work similar in size and scope for each type of wallcovering

1.3 CLOSEOUT SUBMITTALS

- A. Manufacturer's maintenance instructions for the wood veneer wallcovering

1.4 QUALITY ASSURANCE

- A. Applicator: Installation by skilled wallcovering applicators for each type of applications
- B. For each wallcovering application, install a minimum of 3 panels of wallcovering for Architect and Owner review, prior to installation of the remaining panels.

1.5 PROJECT CONDITIONS

- A. Wood Veneer Wall Covering
 1. Maintain a constant temperature range between 65 degrees F and 85 degrees F, with not more than 50% relative humidity and not less than the prevailing humidity in the project area. Refer to AWI Quality Standards for additional information. Conditions should be maintained for a minimum of 4 days prior to installation, and through out installation process.
 2. Provide a minimum Level 4 Gypsum board finish.
 3. Provide a minimum of 80-foot candles per square foot for the duration of the installation period.
- B. Custom Graphic Wallcovering
 1. Conform to the wallcovering manufacturing requirements for conditions and duration of wallcovering.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide materials that comply with Class A Fire Rating when tested in accordance with ASTM E84 with the following characteristics:
 - 1. Flame Spread: 10
 - 2. Smoke Developed: 25

2.2 WOOD VENEER WALLCOVERING

- A. Basis of Design: Arbor Wood Veneer Wallcovering distributed by Koroseal Interior Products, LLC – refer to Finish Schedule for specific species, cut and finish.
 - 1. Products with comparable visual match that is acceptable, and coordinates with the resilient plank flooring, will be reviewed by Architect, including potential alternative methods will be considered
 - a. Riken Wood Wall Covering, laminated to substrate
- B. Accessories:
 - 1. Adhesive:
 - a. Roman Decorating products, Extra Strength Pro-732, Clay Strippable Pro-774
 - b. Gardner-Gibson Products: Dynamite 111 Heavy Duty Clay or Dynamite 433 Heavy-Clay Strippable
 - 2. Substrate Primer Sealer: Acrylic base primer for use with wood veneer wallcovering
 - a. Roman Decorating products: Pro-935, Pro-977
 - b. Zinsser Company Products:
 - 1) Bulls-Eye 1-2-3 Primer Sealer
 - 2) Shieldz Universal Plus Primer
 - 3) Gardz High Performance Sealer

2.3 CUSTOM GRAPHIC WALLCOVERING

- A. Refer to Basis of Design Wallcovering to be used as substrate.
- B. Owner will provide high resolution graphics to the Contractor for completion of the Work
 - 1. Contractor to anticipate graphics will require full color work.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
- C. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- D. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.2 WOOD WALLCOVERING INSTALLATION

- A. Verify substrate moisture content does not exceed 7 percent prior to commencement of installation.

- B. Install wood veneer wall coverings in strict accordance with manufacturer's written installation instructions.
- C. Install each sheet in sequential, numerical order, as printed on the back of each sheet.

3.3 CUSTOM GRAPHIC WALLCOVERING

- A. Install in accordance with manufacturer and printer's instructions.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and the application of paint on interior and exterior substrates including
 1. Steel.
 2. Galvanized metal.
 3. Wood.
 4. Gypsum board.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint and finish system and in each color and gloss required.
 1. Provide sample showing full system of primer and all indicated coats (first, intermediate and top)

1.3 CLOSEOUT SUBMITTALS

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each finish system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of finish selections will be based on mockups.
 - a. If preliminary color and stain selections are not approved, apply additional mockups of additional colors and stains selected by Architect at no added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacture's label with the following information:

1. Product name and type (description).
2. Batch date.
3. Color number.
4. Environmental handling requirements.
5. Surface preparation requirements.
6. Application instructions.

- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. For final coats or touch-up of darker accent colors – apply finish from wall to wall.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
1. Benjamin Moore & Co.
 2. PPG Paints.
 3. Sherwin-Williams Company (The)
- B. Products: Subject to compliance with requirements, products to match colors in the Interior Finish Legend for the finish category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Wood: 10 percent.
 2. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of doors and entire exposed surface of door frames.
 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 5. Paint entire exposed surface of window frames and sashes.
 6. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 7. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR FINISH SCHEDULE

- A. Steel Substrates:
1. Institutional Low-Odor/VOC Latex System
 - a. Prime Coat: Primer, rust inhibitive, water based
 - 1) Basis of Design: Sherwin-Williams Pro-Industrial Pro-Cryl Universal Primer
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC
 - 1) Basis of Design: Sherwin-Williams ProMar 200 Zero VOC Latex
 2. Water-Based Dry-Fall System:
 - a. Prime Coat: Primer, rust inhibitive, water based
 - 1) Basis of Design: Sherwin-Williams Pro-Industrial Pro-Cryl Universal Primer
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Top Coat: Dry-fall latex, Sheen as selected by Architect
 - 1) Basis of Design: Sherwin-Williams Pro Industrial Acrylic Dryfall
 - a) Flat: B42-181 Series, at 6.0 mils wet, 1.5 mils dry.
 - 2) Eggshell: Eg-Shel, B42-82, at 6.0 mils wet, 1.9 mils dry.
 - 3) Semi-gloss: B42-83, at 5.8 mils wet, 2.3 mils dry.

- B. Gypsum Board Substrates:
 - 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC
 - 1) Basis of Design: Sherwin-Williams ProMar 200 Zero VOC Latex Primer
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - a. Topcoat: Latex, interior, institutional low odor/VOC
 - 1) Basis of Design: Sherwin-Williams ProMar 200 Zero VOC Latex
 - a) Eggshell: Eg-Shel, B42-82, at 6.0 mils wet, 1.9 mils dry.
 - b) Semi-gloss: B42-83, at 5.8 mils wet, 2.3 mils dry.
- C. Wood Substrates
 - 1. Latex System
 - a. Prime Coat: Primer sealer, latex interior,
 - 1) Basis of Design: Sherwin-Williams PrepRite ProBlock Primer Sealer B51-620 Series
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, Sheen as selected by Architect.
 - 1) Basis of Design: S-W ProMar 200 Zero VOC Latex
 - a) Low Sheen: B24-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
 - b) Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.

END OF SECTION

SECTION 10 11 00

VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Tackable Wall Panels

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
- C. Samples: For each type of visual display unit indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.

2.2 TACKABLE WALL PANELS (TB)

- A. Basis of Design: Forbo Bulletin Board, unframed
- B. Characteristics:
 - 1. Bulletin Board Substrate: ¼ inch thick MDF board
 - 2. Tackable surface: ¼ inch thick linoleum impregnated cork
 - 3. Through Color tackable surface
 - 4. Self-healing characteristics.
- C. Accessory Products:
 - 1. Manufacturer recommended adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Room signage – match existing to align with University standards
- B. Dimensional Characters

1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show message list, timesteps, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 ROOM SIGNAGE

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
- B. Room-Identification Sign: Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles to match campus standards and existing adjacent signage.
 - 1. Laminated-Sheet Sign: Photopolymer sheet with raised graphics.
 - a. Composite-Sheet Thickness: 0.25 inch
 - b. Subsurface Graphics: Reverse etch image.
 - c. Mounting: Manufacturer recommended Adhesive for each substrate.
 - 2. Text and Typeface: Accessible raised characters and Braille.

2.2 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
 - 1. Character Material: Cast aluminum.
 - 2. Character Height: 3 inches (5 inches).
 - 3. Finishes:
 - a. Integral Aluminum Finish: Match Architect's sample.
 - 4. Mounting: Projecting studs.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:
1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

END OF SECTION

SECTION 10 26 00

WALL PROTECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Cornerguards

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
 - 1. Include plans, elevations, sections, and attachment details.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Material certificates.
- C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall-protection units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Class A.
- B. Accessibility requirements of authority having jurisdiction.

2.2 PRODUCTS

- A. Description
 - 1. Surface-Mounted, Metal Type: Stainless steel
 - a. Metal: Minimum 16 gauge
 - b. Leg length: 2 inches on each side
 - c. Height: 4 feet above wall base.
 - d. Application: Adhesive
 - e. Finish: #4 Satin

- B. Adhesive: As recommended by protection product manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fire Protection Cabinets for Owner Provided and Installed portable fire extinguishers

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.
- C. Samples: For each type of exposed finish required.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 MANUFACTURER

- A. Basis of Design: Larsen's Occult or comparable product by one of the following
 1. JL Industries

2.3 FIRE PROTECTION CABINETS

- A. Type: Fire extinguisher.
- B. Cabinet Construction: Nonrated
- C. Mounting: Recessed.
- D. Door Style: Vertical duo panel with frame
- E. Door Glazing: Tempered float glass (clear).

- F. Finish: Steel
 - 1. Finish: Baked Enamel or Power Coat to match existing fire hose cabinet

2.4 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.

PART 3 - EXECUTION

3.1 CABINET INSTALLATION

- A. Prepare recesses for fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply decals at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION

SECTION 10 55 54

SMART LOCKERS AND SMART MAILBOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Smart Lockers and Smart Mailboxes
- B. This Section is affected by one or more Alternates – refer to Section 01 23 00 – Alternates
 1. Article 1.2 of this section applies to the Work when Owner Procures and Installs the smart lockers and smart mailboxes.
 2. The remainder of this section applies to the General Contractor when procurement and installation of the smart lockers and smart mailboxes will be

1.2 COORDINATION WITH SEPARATE SMART LOCKER AND SMART MAILBOX CONTRATOR

- A. As part of the Base Bid – the Owner may contract with a separate contractor for the procurement and installation of the smart lockers and smart mailboxes indicated on the Drawings. Contractor for the renovation work will be required to coordinate with the Locker/Mailbox Contractor as the Work will be completed concurrently with the renovation work.
- B. Should a separate contractor be engaged, the following conditions will dictate the coordination and work conditions.
 1. Manufacturing, delivery, and installation of Owner Provided Smart Lockers and Smart Mailboxes is not within the General Contractor's scope. General Contractor is to coordinate with Owner's Installer for date, time, duration, and conditions of delivery to project site and installation in a manner that will not cause delay to the project. General Contractor is responsible for site preparations, including providing site access within the construction area, required clear dimensions for equipment install, level, true, and complete adjacent floor and wall conditions, and power and data supply. At scheduled time of install, General Contractor shall provide a relatively dust-free environment with adequate lighting and access for the Owner's Installer. Install location to be clear of debris and have a floor level gradient no greater than 1%, or 1 inch over 100 feet.
 2. General Contractor is responsible for power and active data cabling to terminal boxes as shown in drawings. Final installation of all Owner provided components, including power and data connections, be completed by Owner's Installer, including coordination with University IT Networking team to establish connection between kiosk and server including opening of necessary firewall ports for startup and operation.
 3. Following installation, General Contractor is responsible for maintaining a clean environment and protection of the Owner provided smart lockers, smart mailboxes and controllers from impact, dust, extreme environmental conditions, or other conditions that may cause damage to the appearance or function of the system. General Contractor will be responsible for wall trim or finishing materials needed after lockers are installed.

1.3 ACTION SUBMITTALS – GENERAL CONTRACTOR PROVIDED SMART LOCKERS AND SMART MAILBOXES

- A. Product Data: For each type of product.
- B. Shop Drawings: For postal specialties. Include plans, elevations, sections, and attachment details.

- C. Samples: For each type of exposed finish.
- D. Sample warranty.

1.4 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of smart lockers and smart mailboxes that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.5 COORDINATION WITH SMART LOCKER AND SMART MAILBOX MANUFACTURERS

- A. Assembled components of the smart lockers and smart mailboxes are required to be coordinated with the clear opening dimensions indicated on Construction Documents. Due to existing conditions and limited tolerances, assembled smart lockers and smart mailboxes in excess of those indicated on Drawings will not be acceptable.

PART 2 - PRODUCTS

2.1 MANUFACTURERS/SYSTEMS

- A. ASU Preferred Brand: TZ Smart Lockers and Smart Mailboxes by TZ Limited
- B. Subject to compliance with requirements other manufacturers include:
 - 1. Florence Corporation
 - 2. Luxer One

2.2 SMART LOCKERS AND SMART MAILBOXES

- A. Rear-Loading smart lockers and smart mailboxes: Consisting of multiple compartments with fixed, solid compartment backs, enclosed within recessed wall box.
 - 1. Compartments: Manufacturer's standard compartments with metal doors.
 - a. Smart Lockers: Total of 484 Lockers controlled by 4 pedestal touch panels consisting of the following:
 - 1) Medium Smart Lockers: 52 (H 14.5" x W 17" x D 18.5")
 - 2) X-Small Smart Lockers: 256 (H 4.25" x W 17" x D 18.5")
 - 3) Small Smart Lockers: 176 (H 9.25" x W 17" x D 18.5")
 - b. Mailboxes: 140 (H 5" x W 10.75" x D 15.5") controlled by 2 pedestal touch panels
 - 2. Exposed Finish: Finish surfaces exposed to view as follows:
 - a. Baked-Enamel or Powder-Coated Finish: Color to match RAL 7036

2.3 ACCESSORIES

- A. Podium Touch screen with camera, barcode reader and scanner.
- B. Internet as required by manufacturer.
- C. Software to include Tracking and multiple access for package/mail retrieval.
 - 1. Fully encrypted data protection.
 - 2. Remote access available

2.4 FABRICATION

- A. Form mailbox and lockers to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed

metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

- B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.
- C. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer recommendations and instructions.
- B. Tolerances: Install level and plumb within manufacturer tolerances.

END OF SECTION

SECTION 220210 – PLUMBING SUMMARY OF WORK

Engineer of Record for plumbing work is Chris M. Martin, PE, Salas O'Brien, 1620 Midtown Place (27609), P. O. Box 19944, Raleigh, NC 27619. Plumbing work shall be defined by drawings numbered with the prefix "P", the general provisions of the Contract including General Conditions and Supplementary Conditions, Division 1 Specifications sections, and Division 22 Technical Specifications listed below. In addition, plumbing work may be defined by reference to other documents from any of the above-named sources as well as by project addenda.



DIVISION 22 - PLUMBING

Section	Title
220210	Plumbing Summary of Work
220529	Plumbing Hangers and Supports
220700	Plumbing Insulation
221416	Storm Water Piping

END OF SECTION 220210

1 **SECTION 220529 – PLUMBING HANGERS AND SUPPORTS**

2
3 **PART 1 - GENERAL**

4
5
6 **RELATED DOCUMENTS**

7
8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
9 Specification sections, apply to work of this section.

10
11
12 **QUALITY ASSURANCE**

13
14 Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc. Standard Compliance: Comply
15 with MSS SP-58 *Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and*
16 *Installation* for pipe hangers and supports.

17
18 ASTM Compliance: Structural steel elements utilized for piping or equipment support shall comply with ASTM A 36.

19
20
21 **SUBMITTALS**

22
23 General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of
24 this specification. Where a submitted item does not **comply fully** with each and every requirement of the
25 Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying
26 features of items are very specific. See Section 019913 for exact requirements.

27
28 Manufacturer's Data: Submit manufacturer's technical product data, including installation instructions for each type of
29 support and anchor.

30
31
32 **PART 2 - PRODUCTS**

33
34
35 **GENERAL**

36
37 Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses
38 within limits and under conditions indicated according to ASCE/SEI 7.

39
40 Design supports for multiple pipes, including floor stands, to be capable of supporting combined weight of
41 supported systems and system contents.

42
43 Design equipment supports capable of supporting combined operating weight of supported equipment and
44 connected systems and components.

45
46 Structural support elements shall be fabricated from standard structural shapes complying with ASTM A 36 and/or
47 from preformed channel struts.

48
49 Preformed channel struts shall be 1-5/8 inches wide by height required to meet load capacities and designs indicated
50 on the drawings. Strut shall be made from steel meeting the minimum mechanical properties of ASTM A653 SS,
51 Grade 33, G90 galvanized. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM
52 A907 SS, Grade 33. All fittings and hardware shall be zinc plated in accordance with ASTM B633, SC3 for fittings
53 and SC1 for threaded hardware. Channel members shall be "Unistrut", Allied Support Systems "Power Strut", or
54 Cooper B-Line Systems, Inc. "Strut System", specifically sized in accordance with the criteria hereinbefore specified.

1 Building attachments for hangers and supports shall be as indicated on the Drawings. Where attachments are not
 2 indicated, they shall be as follows:
 3

Attachment To	Attachment Method(s)
Concrete	Bolt to channel-type concrete inserts or utilize expansion anchors. Size concrete housekeeping pads so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base. Drill at locations and to depths that avoid reinforcing bars.
Solid Concrete Masonry Unit Walls	Use expansion anchors.
Hollow Walls	Bolt to slotted steel channels fastened to wall with expansion anchors.
Wood Structural Members	Install bolts through members.
Steel	Bolt hangers to MSS Type 19, 21, or 23 clamps on flanges of beams or on upper truss chords of bar joists. To avoid stressing building steel structural elements, provide additional steel support members that span at least two beams or bar joists as required or as shown on the Drawings. Attach additional steel support members via welding in accordance with AWS standards.

4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41

PIPE HANGERS AND SUPPORTS

Horizontal Pipe Hangers: Except as otherwise indicated, provide factory-fabricated horizontal-piping hangers complying with MSS SP-58, of the following MSS types listed, to suit horizontal-piping systems:

For exterior and wet/damp locations, hangers and rods are to be hot dipped galvanized.

Adjustable Steel Clevis Hangers: MSS Type 1.

Copper Pipe Hangers: Copper-plated or -coated steel.

Insulation Protection: Provide MSS Type 40 insulation shield at each pipe support.

Trapeze Pipe Hangers: Trapeze hangers shall be field-fabricated from structural steel members or from preformed channel members and suspended by all-thread hanger rods; weld steel, as required, in accordance with AWS standards. Each pipe on a trapeze hanger shall be individually supported as follows:

Adjustable Pipe Saddle: MSS Type 36 with adjustable support Classification Types 2 and 3 piping.

Adjustable Pipe Roller: MSS Type 41 with adjustable supports for Classification Type 1 piping.

Copper Pipe Saddle: Copper-plated or -coated steel.

Insulation Protection: Provide MSS Type 40 insulation shield at each pipe support.

Vertical Piping: Provide factory-fabricated riser clamps complying with MSS Type 8 to support vertical piping systems. Select size of vertical piping clamps to exactly fit pipe size of bare pipe. Provide copper-plated clamps for copper-piping systems.

PART 3 - EXECUTION

INSTALLATION OF HANGERS AND SUPPORTS

Use only one type by one manufacturer for each piping service. Select size of hangers and supports to exactly fit pipe size for bare piping and to exactly fit around piping insulation for insulated piping.

Arrange for grouping of parallel runs of horizontal suspended piping to be supported together on trapeze type hangers where possible. Install supports with maximum span and all-thread hanger rods in accordance with the following:

Nominal Pipe Size (in.)	Max. Span for Copper Tubing (ft.)	Max. Span for Steel Pipe (ft.)	Min. All-Thread Hanger Rod Size (in.)
<1	5	7	3/8
1 to 1-1/4	6	7	3/8
1-1/2	8	9	3/8
2	8	10	3/8
2 -1/2	9	10	1/2
3	10	12	1/2
4	10	12	5/8
6	10	12	3/4
8-12	10	12	7/8

Where piping of various sizes is to be supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe.

Where piping of various types and/or sizes is supported together by a trapeze hanger, space hangers based on the lowest maximum span allowed or install intermediate supports for pipe requiring more frequent support.

Hangers and supports for piping shall be attached to the building structure; **attachment to other piping, ductwork, or equipment is prohibited. The use of wire or perforated strap hangers is prohibited.**

END OF SECTION 220529

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25
- 26
- 27
- 28
- 29
- 30
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59

SECTION 220700 - PLUMBING INSULATION

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 225) method.

SUBMITTALS

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Manufacturer's Data: Submit manufacturer's technical product data and installation instructions for each type of mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished accessories for each mechanical system requiring insulation.

Samples: Submit, if requested by A-E, manufacturer's sample of each piping insulation type required, and of each duct and equipment insulation type required. Affix label to sample completely describing product.

PART 2 - PRODUCTS

PIPING INSULATION MATERIALS

Mineral Fiber Insulation:

Insulation shall be made of fibers manufactured from glass, rock, or slag, processed from the molten state, with or without a binder.

Insulation shall be heavy density pre-formed sectional type for pipe and in accordance with ASTM C 547, Class I, factory-jacketed.

Glass fiber insulation shall be rated for fluid temperature up to 850-degrees F.

Insulation Protection: Provide MSS Type 40 insulation shield for Classification Types 1A, 2, and 3 piping at each pipe support.

Jackets for Piping Insulation: Insulation jackets shall be all-service vapor retarder type as follows:

Piping Operating at Temperatures Above Ambient: Jacket shall be "ASJ" type, consisting of white, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

Piping Operating at Temperatures Below Ambient: FSK Jacket, Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

1 Covering for Piping Insulation Exposed to View:

2
3 Encase all indoor straight piping insulation with glossy, 20-mil high impact UV- resistant PVC jacket meeting
4 requirements of ASTM D 1784, Class 16353-C. **Jackets shall have integral colors as required by**
5 **Section 220553.**
6

7 Encase all indoor pipe fittings insulation with one-piece pre-molded 20-mil UV-inhibited PVC fitting
8 covers complying with ASTM C450 for dimensions and fastened as per manufacturer's
9 recommendations. **Jackets shall have integral colors as required by Section 220553.**
10

11
12 **PART 3 - EXECUTION**
13

14
15 **PIPING SYSTEMS INSULATION APPLICATIONS**
16

17 Piping systems shall be classified in accordance with MSS SP-58, as follows, and be insulated as hereinafter
18 specified:
19

Classification	Temperature Range (deg F)
Type 1: Hot Systems	Type 1A: 100-200
Type 2: Ambient Systems	71-99
Type 3: Cold Systems	Type 3A: 32-70

20
21 Classification Type 1A Piping: Insulate the following plumbing piping systems:
22

23 Potable hot water piping.

24 Potable hot water recirculating piping.

25
26 Insulate with mineral fiber, 1-1/2 " thick for pipe sizes up to and including 1-1/4", 2" thick for pipe sizes 1-1/2"
27 and larger.
28

29 Exception: Omit insulation on chrome-plated exposed piping (except for handicapped fixtures), air
30 chambers, unions, strainers, check valves, balance cocks, flow regulators, drain lines from water coolers,
31 drainage piping located in crawl spaces or tunnels, buried piping, fire protection piping, and pre- insulated
32 equipment.
33

34
35 Classification Type 3A Piping: Insulate the following plumbing piping systems:
36

37 Potable cold water piping.

38 Interior, horizontal above ground primary and secondary roof drainage piping.

39 Plumbing vents within 6 feet of roof outlet.

40 P-trap and Interior, horizontal waste piping from floor drains receiving cooling coil condensate
41 drainage to connection point with waste main piping.
42

43 Insulate with mineral fiber, 1" thick for pipe sizes up to and including 2", 1-1/2" thick for pipe sizes 2-1/2"
44 and larger.
45

46 Insulate with mineral wool insulation, 1-1/2" thick for pipe sizes up to and including 1", 2" thick for pipe sizes
47 1-1/4" through 2", and 2-1/2" thick for pipe sizes over 2".
48

1 **GENERAL PIPING INSULATION INSTALLATION REQUIREMENTS**

2
3 Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids
4 throughout the length of piping including fittings, valves, and specialties.

5
6 Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe
7 system as specified in insulation system schedules.

8
9 **For Classification Type 3A piping, do not insulate valves, strainers, unions, and other accessories.**

10
11 Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not
12 corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

13
14 Install insulation with longitudinal seams at top and bottom of horizontal runs.

15
16 Install multiple layers of insulation with longitudinal and end seams staggered.

17
18 Do not weld pins, clips, or other insulation attachment devices to piping, fittings, and specialties.

19
20 Keep insulation materials dry during application and finishing.

21
22 Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by
23 insulation material manufacturer.

24
25 Install insulation with least number of joints practical.

26
27 Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and
28 other projections with vapor-barrier mastic.

29
30 Install insulation continuously through hangers and around anchor attachments:

31
32 At pipe hangers and supports, protect the insulation from compression by installing cellular glass piping
33 insulation for the length of the insulation shield specified above.

34
35 Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with
36 adhesive or sealing compound recommended by insulation material manufacturer.

37
38 Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to
39 protect jacket from tear or puncture by hanger, support, and shield.

40
41 For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of
42 attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure
43 with vapor-barrier mastic.

44
45 Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film
46 thicknesses.

47
48 Install insulation with factory-applied jackets as follows:

49
50 Draw jacket tight and smooth.

51
52 Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket.

53
54 Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

55
56 Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom
57 of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along
58 edge at 2 inches o.c.

- 1 For below-ambient services, apply vapor-barrier mastic over staples.
2
3 Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to
4 maintain vapor seal.
5
6 Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to
7 pipe flanges and fittings.
8
9 Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
10
11 Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal
12 movement.
13
14 Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4
15 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
16
17 For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint
18 sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications
19 tightly joined to indoor insulation ends. Seal joint with joint sealant.
20
21 Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
22
23 Seal jacket to roof flashing with flashing sealant.
24
25
26 Interior Wall, Partition, and Floor Penetrations: Install insulation continuously through walls, partitions, and floors.
27 Seal penetrations through fire-rated assemblies complying with requirements of Section 019913 for firestopping and
28 fire-resistive joint sealers.
29
30

31 **INSTALLATION OF MINERAL FIBER PIPING INSULATION**

32 33 Insulation Installation on Straight Pipes and Tubes:

34
35 Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without
36 deforming insulation materials.
37

38 Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier
39 mastic and joint sealant.
40

41 For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched
42 staples at 6 inches o.c.
43

44 For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs.
45 Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal
46 with vapor-barrier mastic and flashing sealant.
47

48 Insulation Installation on Pipe Fittings and Elbows:

49
50 Install preformed sections of same material as straight segments of pipe insulation when available.
51

52 When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to
53 a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
54

55 ***Insulation Installation on Valves and Pipe Specialties:***

56
57 Install preformed sections of same material as straight segments of pipe insulation when available.
58

59 When preformed sections are not available, install mitered sections of pipe insulation to valve body.
60
61

1 Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2
3 Install insulation to flanges as specified for flange insulation application
4
5

6 **FIELD-APPLIED INSULATION JACKET INSTALLATION**

7
8 Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
9

10 Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.

11
12 Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
13

14 Completely encapsulate insulation with coating, leaving no exposed insulation.
15

16 Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints;
17 for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with
18 manufacturer's recommended adhesive. Apply two continuous beads of adhesive to seams and joints, one bead
19 under lap and the finish bead along seam and joint edge.
20

21
22 **EXISTING INSULATION REPAIR**

23
24 Repair damaged sections of existing mechanical insulation damaged during this construction period. Use insulation
25 of same thickness as existing insulation, install new jacket lapping and sealed over existing.
26

27
28 **END OF SECTION 220700**

SECTION 221416 – STORM WATER PIPING

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

ANSI Compliance: Comply with applicable ANSI standards pertaining to materials, products, and installation or soil and waste systems.

ASSE Compliance: Comply with applicable ASSE standards pertaining to materials, products, and installation of soil and waste systems.

PDI Compliance: Comply with applicable PDI standards pertaining to products and installation of soil and waste systems.

Piping Identification: Each length of pipe and pipe fitting, trap, etc. installed as part of a plumbing system shall bear the identification of the manufacturer and the applicable standard to which it was manufactured.

SUBMITTALS

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Manufacturer's Data: Submit manufacturer's technical product data for soil waste systems materials and products.

Inspection Reports: Submit copies of field inspection reports required by Part 3.

PART 2 - PRODUCTS

PIPES AND PIPE FITTINGS

Piping Materials: Provide pipe and tube of type, joint type, grade, size and weight (wall thickness or Class) indicated for each service. Where type, grade or class is not indicated, provide proper selection as determined by Installer for installation requirements, and comply with governing regulations and industry standards.

Pipe/Tube Fittings: Provide factory-fabricated fittings of type, materials, grade, class and pressure rating indicated for each service and pipe size. Provide sizes and types matching pipe, tube, valve or equipment connection in each case. Where not otherwise indicated, comply with governing regulations and industry standards for selections, and with pipe manufacturer's recommendations where applicable.

Above Ground Piping:

Pipe Size 2" and Larger: Hubless cast-iron soil pipe and fittings, Service class. Conform to CISPI Standard 301/ASTM A 888, Service class, with heavy duty neoprene rubber/stainless steel couplings conforming to ASTM C1540. For pipe sizes 1-1/2" through 4", couplings shall have a minimum four (4) bands and for pipe sizes 5" through 15", provide minimum six (6) bands.

1 Below Ground Piping:

2
3 Pipe Size 15" and Smaller: Cast-iron hub-and-spigot soil pipe and fittings, Service class. Joints shall be
4 sealed with neoprene gaskets complying with CISPI Standard 310/ASTM C 564.
5
6

7 **PIPING SPECIALTIES**

8
9 Cleanouts and Access Covers: Provide as follows; equivalent products manufactured by Josam or Zurn will be
10 acceptable:

11
12 Cleanouts in Walls: J. R. Smith No. 4420 ferrule with No. 4710 satin finish chrome plated brass or stainless
13 steel round access cover secured to plug by a countersunk brass screw in finished areas and satin finish
14 brass cover in unfinished storage and similar habitable unfinished areas.
15

16 Cleanout Plugs: Cast-bronze or brass, threads complying with ANSI B2.1, countersunk head.

17 Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp
18 and sleeve length as required.
19

20
21 **PART 3 - EXECUTION**

22
23
24 **INSTALLATION OF STORM DRAIN PIPING**

25
26 Install above ground piping plumb and square with building structure, supported both horizontally and vertically in
27 accordance with Section 220529. Construct piping joints as follows:
28

29 Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
30

31 Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp
32 dies. Ream threaded pipe ends to remove burrs and restore full ID. Apply appropriate tape or thread
33 compound to external pipe threads unless dry seal threading is specified.
34

35 Lay underground drain piping beginning at low point of systems, true to grades and alignment indicated with
36 unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with
37 manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Clean
38 interior of piping of dirt and other superfluous material as work progresses. Maintain swab or drag in line and pull
39 past each joint as it is completed. Place plugs in ends of uncompleted piping at end of day or whenever work stops.
40

41 Install piping pitched to drain at minimum slope of 1/4" per foot (2%) for piping 2-1/2" and smaller, and 1/8" per foot
42 (1%) for piping 3" and larger.
43

44 Make changes in direction using appropriate 45-degree wyes, half-wyes, or long sweep quarter, sixth, eighth, or
45 sixteenth bends. Sanitary tees or short quarter bends may be used on vertical stacks of drainage lines where the
46 change in direction of flow is from horizontal to vertical, except use long-turn tees where two fixtures are installed
47 back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines.
48

49 No change in direction of flow greater than 90 degrees shall be made.
50

51 Where different sizes of drainage pipes and fittings are connected, use proper size, standard increasers and
52 reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.
53

54 Fabricate steel pipe nipples from same pipe as used for connected pipe. Use Schedule 80 pipe for nipple fabrication
55 where unthreaded length is less than 1-1/2" or where pipe size is less than 1-1/2" NPS. **Do not thread nipples full
56 length, "close" nipples are prohibited.**
57

58 Install cleanouts as indicated or required and at each change in direction of piping greater than 45 deg.; at minimum
59 intervals of 50' for piping 4" and smaller and 80' for larger piping; and at base of each roof drain leader. Install floor
60 and wall cleanout covers for concealed piping, select type to match adjacent building finish. Install cleanouts at the
61 base of all piping risers.

1 Where drain piping passes through fire rated walls, partitions, ceilings, or floors, maintain the fire rated integrity in
2 accordance with Section 019913.
3

4
5 **FIELD QUALITY CONTROL**
6

7 Inspections by the Authority Having Jurisdiction:
8

9 Do not enclose, cover, or put into operation drainage piping system until it has been inspected and approved
10 by the authority having jurisdiction.
11

12 During the progress of the installation, notify the authority having jurisdiction, at least 24 hours prior to the
13 time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
14

15 Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in
16 after system is roughed-in, and prior to setting fixtures.
17

18 Final Inspection: Arrange for a final inspection to observe the tests specified below and to insure
19 compliance with the requirements of the plumbing code.
20

21 Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange
22 for it to be reinspected by the authority.
23

24 Submit copies of written inspection reports, signed by the authority having jurisdiction, immediately following
25 testing to the A/E for review.
26

27 Hydrostatic and Leakage Tests:
28

29 Conduct hydrostatic and leakage tests in accordance with Article 312 of the *North Carolina State Building*
30 *Code: Plumbing Code*.
31

32 When leakage or pressure drop exceeds the allowable amount specified, make repairs/ corrections and
33 retest. Correct visible leaks regardless of leakage test results.
34

35 Submit written reports of all hydrostatic and/or leakage tests immediately following testing to the A/E for
36 review.
37

38
39 **OWNER INSTRUCTION AND TRAINING**
40

41 Provide Owner instruction and training in accordance with Section 019926.
42
43

44 **END OF SECTION 221416**

SECTION 230210 – HVAC SUMMARY OF WORK

Engineer of Record for Heating, Ventilating, and Air-Conditioning work is Chris P. Cagle, PE, Salas O'Brien, 1620 Midtown Place (27609), P. O. Box 19944, Raleigh, NC 27619. Heating, Ventilating, and Air-Conditioning work shall be defined by drawings numbered with the prefix "H-", the general provisions of the Contract including General Conditions and Supplementary Conditions, Division 1 Specification sections, and Division 23 Technical Specification sections listed below. In addition, Heating, Ventilating, and Air-Conditioning work may be defined by reference to other documents by any of the above-named sources as well as by project addenda.



DIVISION 23 - HVAC TECHNICAL SPECIFICATIONS

Section	Title
230210	HVAC Summary of Work
230510	HVAC Basic Requirements
230529	Hangers and Supports for Piping, Ductwork & Equipment
230553	HVAC Painting and Identification
230593	HVAC Testing, Adjusting, and Balancing
230713	HVAC Duct Insulation
233100	HVAC Ductwork
233300	Air Duct Accessories
233713	Diffusers, Registers, and Grilles

END OF SECTION 230210

SECTION 230510 – HVAC BASIC REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

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

The requirements specified herein shall govern all Sections in Division 23, whether stated therein or not.

Where items specified in the other sections of this Division conflict with requirements of this Section, the former shall govern.

SUBMITTALS

Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal requirements are defined in each section of this Division.

Submit Welder's and Brazer's Qualifications in accordance with Section 019913. Welders' and Brazers' Qualifications: Operators who are to do the welding and/or brazing must be properly qualified to do satisfactory work. **Proof of an operator's qualifications shall be either the Contractor's record of suitable tests passed within the preceding six months while in the employ of the Contractor, or tests made before the start of work.**

Submit qualification data for each operator prior to their starting work. Any workman considered by the A-E as not having the skill necessary for the work shall be required to pass an appropriate qualification test or shall be at once barred from further welding and/or brazing on the project.

EQUIPMENT SELECTION

Pump heads and fan static pressures indicated on the Drawings are for estimating purposes and are based on the individual equipment losses as indicated. If the Contractor proposes using equipment, components, pipe or duct routing, etc. that will increase the pump heads and/or fan static pressures, any required pump or fan changes, along with associated motor and power wiring changes, shall be at the Contractor's expense.

TEMPERATURE AND HUMIDITY CRITERIA

Indoor temperature and humidity conditions in occupied spaces, unless specifically specified or indicated otherwise on the Drawings, shall be maintained as follows:

Space/ Area	Indoor Air Condition	Occupied Periods	Unoccupied Periods
General occupied spaces	Dry Bulb Temperature	70-75 deg F	55 deg F, Minimum 85 deg F, Maximum
	Relative Humidity	30-60% RH	65% RH Maximum

1 **ACOUSTIC CRITERIA**

2
3 Noise levels due to HVAC equipment, ducts, grilles, registers, diffusers, etc., shall result in maximum sound levels in
4 occupied spaces conforming to the following Room Criteria (RC):
5
6

Max. RC	Environment	Typical Occupancy
35	Quiet, suitable for conference at 15 ft. table; normal voice 10-30 feet; telephone use satisfactory.	Private offices
40	Satisfactory for conferences at 6-8 ft. table; normal voice 6-12 ft.; telephone use satisfactory	General (open) offices

7
8
9 **PART 2 - PRODUCTS (Not Used)**

10
11
12 **PART 3 – EXECUTION**

13
14
15 **OPERATION OF HVAC SYSTEMS**

16
17 **The use of permanent HVAC systems to support general construction activities is prohibited.** The need for
18 heating, cooling, dehumidification, and/or ventilation during construction by the General Contractor or any project
19 sub-contractor shall be met via use of temporary HVAC units or systems, as specified in Division 01, provided by the
20 contractor(s) having the need.
21

22 HVAC equipment, subsystems, and/or systems may be started and temporarily operated as necessary to perform the
23 work, testing, balancing, and/or verification as specified in various sections of Division 23. Air systems shall be
24 started **only** after general construction activities in the areas served by the air systems are such that there is low risk
25 of contamination and/or degradation to the system. Generally, the following construction status is required within the
26 entire area served by an individual air system:

27 Floor/wall/ceiling preparation that requires sanding or other dust producing work is complete.

28 Wall/ceiling surfaces required to be painted shall at least have one coat of primer applied.

29 Ceiling spray-on decorative or acoustical coatings, where specified, are complete.

30 Lay-in ceilings, where specified, have been installed.

31 Floors finishes (tile, carpet, paint, etc.) shall be complete.

32
33
34
35
36
37
38 During temporary operation of air systems, the following additional measures are required:

39 Filters shall be installed in fan coil units, air handling units, etc.

40
41
42 Install temporary roll media filters (minimum MERV 13) over each air inlet (return or exhaust). Temporary
43 filters shall be replaced regularly in order to minimize pressure losses impose on fans.

44
45 Windings of open, drip proof electric motors shall be cleaned using low pressure compressed air at the end
46 of each 72 hours of operation.
47

48 Once TAB work has been completed, air systems shall be shut down, temporary filters removed, and air handler
49 filters replaced with new unless specifically directed otherwise by the A-E. **Only upon receipt of written approval
50 by the A-E shall HVAC systems be placed into final service prior to Substantial Completion of the Project.**
51

52
53 **END OF SECTION 230510**

1 **SECTION 230529 – HANGERS AND SUPPORTS FOR PIPING, DUCTWORK AND EQUIPMENT**

2
3 **PART 1 - GENERAL**

4
5
6 **RELATED DOCUMENTS**

7
8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
9 Specification sections, apply to work of this section.

10
11
12 **QUALITY ASSURANCE**

13
14 Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc. Standard Compliance: Comply
15 with MSS SP-58 *Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application, and*
16 *Installation* for pipe hangers and supports.

17
18 SMACNA Compliance: Fabricate and install ductwork hangers and supports in accordance with *HVAC Duct*
19 *Construction Standards - Metal and Flexible*.

20
21 ASTM Compliance: Structural steel elements utilized for piping, ductwork, or equipment support shall comply with
22 ASTM A 36.

23
24
25 **SUBMITTALS**

26
27 General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of
28 this specification. Where a submitted item does not **comply fully** with each and every requirement of the
29 Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying
30 features of items are very specific. See Section 019913 for exact requirements.

31
32 Manufacturer's Data: Submit manufacturer's technical product data, including installation instructions for each type of
33 support and anchor.

34
35
36 **PART 2 - PRODUCTS**

37
38
39 **GENERAL**

40
41 Hangers and supports for HVAC ductwork shall withstand the effects of gravity loads and stresses within limits and
42 under conditions indicated according to ASCE/SEI 7.

43 Design supports for multiple ducts to be capable of supporting combined weight of supported systems and
44 system contents.

45
46 Seismic restraints shall be provided for ductwork as required by Section 019923.

47
48 Structural support elements shall be fabricated from standard structural shapes complying with ASTM A 36 and/or
49 from preformed channel struts.

1 Preformed channel struts shall be 1-5/8 inches wide by height required to meet load capacities and designs indicated
 2 on the drawings. Strut shall be made from steel meeting the minimum mechanical properties of ASTM A653 SS,
 3 Grade 33, G90 galvanized. Fittings shall be manufactured from steel meeting the minimum requirements of ASTM
 4 A907 SS, Grade 33. All fittings and hardware shall be zinc plated in accordance with ASTM B633, SC3 for fittings
 5 and SC1 for threaded hardware. Channel members shall be "Unistrut", Allied Support Systems "Power Strut", or
 6 Cooper B-Line Systems, Inc. "Strut System", specifically sized in accordance with the criteria hereinbefore specified.

7
 8 Building attachments for hangers and supports shall be as indicated on the Drawings. Where attachments are not
 9 indicated, they shall be as follows:

Attachment To	Attachment Method(s)
Concrete	Bolt to channel-type concrete inserts or utilize expansion anchors. Size concrete housekeeping pads so expansion anchors will be a minimum of 10 bolt diameters from the edge of the concrete base. Drill at locations and to depths that avoid reinforcing bars.
Solid Concrete Masonry Unit Walls	Use expansion anchors.
Hollow Walls	Bolt to slotted steel channels fastened to wall with expansion anchors.
Wood Structural Members	Install bolts through members.
Steel	Bolt hangers to MSS Type 19, 21, or 23 clamps on flanges of beams or on upper truss chords of bar joists. To avoid stressing building steel structural elements, provide additional steel support members that span at least two beams or bar joists as required or as shown on the Drawings. Attach additional steel support members via welding in accordance with AWS standards.

11
 12
 13 **DUCT HANGERS AND SUPPORTS**

14
 15 Ductwork hangers shall be fabricated of sheet metal straps in accordance with SMACNA's *HVAC Duct Construction*
 16 *Standards - Metal and Flexible* or of all-thread rod.

17
 18
 19 **PART 3 - EXECUTION**

20
 21
 22 **INSTALLATION OF DUCT HANGERS AND SUPPORTS**

23
 24 Hang or support metal ductwork in accordance with Section 5 of SMACNA's *HVAC Duct Construction Standards -*
 25 *Metal and Flexible*. Where multiple ducts are supported by a common trapeze hanger, the trapeze shall comply with
 26 Table 5-3.

27
 28 Suspend flexible ducts in accordance with SMACNA's *HVAC Duct Construction Standards - Metal and Flexible*,
 29 Figures 3-10 and 3-11.

30
 31 Hangers and supports for ductwork shall be attached to the building structure; **attachment to roof deck or cross-**
 32 **bracing is prohibited; attachment to other ductwork, piping, or equipment is prohibited. The use of wire or**
 33 **perforated strap hangers is prohibited.**

34
 35 Support metal duct risers with structural channels or angles at each floor. Attach structural members to the sides of
 36 the ducts with welds, bolts, or sheet metal screws.

1 Ductwork installed on roofs shall be supported by galvanized structural steel members or preformed channel struts,
2 as indicated on the Drawings, installed on rooftop rails as specified for "Rooftop Pipe Supports" above. Install and
3 anchor rooftop rails to the roof deck before roofing insulation and membrane are installed. Touch-up nicks, scrapes,
4 cuts, etc. of galvanized supports with cold galvanizing paint. All bolts, screws, etc. for rooftop applications shall be
5 stainless steel.
6

7
8
9

OWNER INSTRUCTION AND TRAINING

10 Provide Owner instruction and training in accordance with Section 019926.
11

12
13

END OF SECTION 230529

1 Where cast iron accessories or galvanized duct is to receive finish painting, the item shall be properly cleaned of mill
2 residue before priming. Use primer specific to the application.
3

4 Finish painting of ducts, insulation, etc., located in mechanical equipment rooms and spaces where equipment,
5 piping, etc. is exposed to view shall be provided. Where indicated or specified, existing equipment, duct, etc., shall
6 be cleaned and painted along with new work.
7

8 Exposed to view non-mechanical spaces: Architect/Owner to select colors for finish painting.
9

10 11 **HVAC IDENTIFICATION**

12
13 Where identification is to be applied to surfaces which require insulation, painting or other covering or finish, including
14 valve tags, install identification after completion of covering and painting. Install identification prior to installation of
15 acoustical ceilings and similar removable concealment.
16

17 18 **DUCTWORK IDENTIFICATION**

19
20 Label ductwork exposed to view in mechanical equipment rooms; at each building access point in shafts, attics, etc.;
21 or concealed above lay-in ceilings, as follows:
22

23 Near locations where ducts pass through walls or floors/ceilings, or enter non-accessible enclosures.
24

25 At access doors, manholes, and similar access points which permit view of concealed ductwork.
26

27 Near major equipment items and other points of origination and termination.
28

29 Spaced at maximum spacing of 50' along each duct run.
30

31 32 **CEILING IDENTIFICATION**

33
34 For equipment located above an acoustical lay-in ceiling, provide a clear adhesive label on the ceiling grid directly
35 below the equipment. The label shall indicate in black text the equipment designation (e.g., TU-#, AHU-#, etc.).
36

37 Provide blue colored adhesive 3/4" diameter vinyl "buttons" on the ceiling grid where valves, fire dampers, access
38 doors, etc. are located above.
39

40 41 **OWNER INSTRUCTION AND TRAINING**

42
43 Provide Owner instruction and training in accordance with Section 019926.
44

45
46 **END OF SECTION 230553**

1 **SECTION 230593 – HVAC TESTING, ADJUSTING AND BALANCING**

2
3 **PART 1 - GENERAL**

4
5 **RELATED DOCUMENTS**

6
7 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
8 Specification sections, apply to work of this section.

9
10
11 **DESCRIPTION OF WORK**

12
13 Extent of testing, adjusting, and balancing (TAB) work is includes, but is not necessarily limited to, duct systems and
14 associated equipment and apparatus of HVAC work.

15
16
17 **SUBMITTALS**

18
19 General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of
20 this specification. Where a submitted item does not **comply fully** with each and every requirement of the
21 Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying
22 features of items are very specific. See Section 019913 for exact requirements.

23
24 Certification: Submit TAB subcontractor certification.

25
26 Instrument Calibration Report: Submit calibration test results for balancing instruments.

27
28 TAB Reports: Draft and final test reports

29
30
31 **QUALITY CONTROL**

32
33 TAB work shall be completed by an independent balancing subcontractor certified by the Associated Air Balance
34 Council (AABC) or the National Environmental Balancing Bureau (NEBB).

35
36
37 **PART 2 - PRODUCTS (Not Used)**

38
39
40 **PART 3 - EXECUTION**

41
42
43 **GENERAL**

44
45 After systems have been started up and initially adjusted, the Contractor shall perform tests and accomplish the
46 balancing necessary to provide the air flows indicated on the Drawings.

47
48 TAB subcontractor shall spot check systems with A/E at Final Inspection.

49
50
51 **CERTIFIED TEST REPORTS**

52
53 General: Four copies of the Draft Test and Balance Reports shall be provided to the A/E before the Final Inspection.
54 The reports shall comply with reporting procedures defined in Chapter 13, ASHRAE Standard 111 and as hereinafter
55 specified.

56
57 After the A/E check of the system at or before the Final Inspection, the Final Test and Balance Reports shall be
58 provided to the A/E. **Additionally, one copy of the Final Test and Balance Report shall be submitted to the**
59 **authority having jurisdiction and a copy shall be included with each copy of the Operating and Maintenance**
60 **Manuals.**

1 Certification: Both Draft and Final Reports shall be certified by the TAB subcontractor and shall:

2
3 Be certified proof that the systems have been tested, adjusted, and balanced in accordance with the
4 referenced standards.

5
6 Accurately represent how the systems have been installed.

7
8 Define how the systems are operating at completion of the TAB procedures.

9
10 Draft Reports: Upon completion of TAB procedures, prepare and submit draft reports for review by the A/E. Draft
11 reports may be hand written, but must be complete, factual, and legible. Organize and format draft reports as
12 hereinafter specified.

13
14 Final Reports: After review and verification by the field check by the A/E of the Draft Report, submit the Final
15 Reports, organized and formatted as hereinafter specified.

16
17 Reports Format: Bind report forms complete with schematic systems diagrams and/or plans and other referenced
18 data in reinforced, vinyl, three-ring binders.

19
20 Provide title page listing the name, address, and telephone numbers of the TAB subcontractor. Provide list of all test
21 instruments utilized, along with last date of calibration.

22
23 Provide certification page, signed by the TAB project manager, as hereinbefore specified.

24
25 Divide contents of the binder into the following divisions, as applicable, separated by divider tabs:

26
27 General Information and Summary

28
29 Air Systems TAB

30
31 Reports Contents:

32
33 System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system
34 with single-line diagram and include the following:

35
36 Quantities of outdoor, supply, return, and exhaust airflows.

37
38 Pipe and control valve sizes and locations.

39
40 Flow and/or Flow Balancing stations.

41
42 Location and position of balancing devices (valves, dampers, etc.)

43
44 Design Data and Test Results: For each HVAC component and system, provide design data and final
45 adjusted test data, including but not limited to the following:

Component Data	Test Data (Design and Final Adjusted Values)
Duct Traverse	
Identification (referenced to system diagrams included in TAB reports) System, air-handling-unit, and/or fan identification	Location and zone. Traverse air temperature in deg F Duct static pressure in inches wg Duct size in inches Duct area in sq. ft. Air flow rate in cfm Air velocity in fpm
Air Terminal Device (Register, Grille, Diffuser, etc.)	
System and air-handling unit identification Room/area served Number from system diagram.	Test method Design air flow rate in cfm Design air velocity in fpm

Component Data	Test Data (Design and Final Adjusted Values)
Manufacturer Type and manufacturer's model number. Size (face and neck) Effective area in sq. ft.	Preliminary measured air flow rate in cfm Preliminary measured velocity in fpm Final air flow rate in cfm Final velocity in fpm Space temperature in deg F

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35

TEST AND BALANCE PROCEDURES

Test Instruments Calibration: Instruments for air test and balance shall have been calibrated within a period of six months prior to balancing and tested for accuracy prior to start of work. Calibrate vibrometer utilized for vibration testing before each day of testing using calibrator provided with the meter. Calibrate sound meters before each day of testing using calibrator complying with ANSI S1.40 and NIST certification.

Air Systems Test and Balance Procedures:

General: Air handling and distribution systems, including supply, return, ventilation, and exhaust airflows shall be balanced and adjusted in accordance with Chapter 10 of ASHRAE Standard 111 and Section 7.2.2 of ASHRAE Standard 62.1. Maximum air quantities at each outlet or inlet shall not vary more than -5% to +10% from those indicated on the Drawings.

Drive Changes: If the measured cfm of a supply fan, return fan, or exhaust fan varies more than plus 10% or minus 5% from design, adjust the drive of each fan to obtain required cfm. **Any changes in the pulleys, belts and dampers required for correct balance shall be provided by the Contractor, including replacement of fan and/or motor sheaves.**

A/E QUALITY CONTROL CHECK

In the presence of the A/E during or before the Final Inspection, the TAB subcontractor shall verify the balance of the air systems as follows:

The TAB subcontractor shall provide all test instruments required for the Owner/Engineer check of the air systems balance.

During the A/E check, the TAB contractor shall verify the full range of air flows for the items selected to be checked. The Contractor shall have the controls sub-contractor present during the A/E check of the air systems balance.

END OF SECTION 230593

1 **SECTION 230713 - HVAC DUCT INSULATION**

2
3 **PART 1 - GENERAL**

4
5
6 **RELATED DOCUMENTS**

7
8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
9 Specification sections, apply to work of this section.

10
11
12 **QUALITY ASSURANCE**

13
14 Flame/Smoke Ratings: Provide composite duct insulation (insulation, jackets, coverings, sealers, mastics and
15 adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84
16 (NFPA 225) method.

17
18 Exception: Outdoor HVAC ductwork insulation may have flame spread index of 75 and smoke developed
19 index of 150.

20
21
22 **SUBMITTALS**

23
24 General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of
25 this specification. Where a submitted item does not **comply fully** with each and every requirement of the
26 Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying
27 features of items are very specific. See Section 019913 for exact requirements.

28
29 Manufacturer's Data: Submit manufacturer's technical product data and installation instructions for each type of
30 mechanical insulation. Submit schedule showing manufacturer's product number, k-value, thickness, and furnished
31 accessories for each mechanical system requiring insulation.

32
33 Samples: Submit, as requested by A-E, manufacturer's sample of each duct insulation type required. Affix label to
34 sample completely describing product.

35
36
37 **PART 2 - PRODUCTS**

38
39
40 **INSULATION MATERIALS**

41
42 Mineral Fiber Insulation: Insulation made up of fibers manufactured of glass, rock, or slag, processed from the molten
43 state, with or without a binder.

44
45 Mineral Fiber Board Insulation: ASTM C 612, Type IA or IB, with factory-applied jacket. Insulation density
46 shall be 3.0 pcf or greater and conductivity, k, tested in accordance with ASTM C 518 or C 177 at 75°F
47 mean temperature shall not exceed 0.25 Btu-in./(hr-sf-°F).

48
49 Mineral Fiber Blanket Insulation: ASTM C 553, Type II, with factory-applied jacket. Insulation density shall
50 be 1.00 pcf and conductivity, k, tested in accordance with ASTM C 518 or C 177 at 75°F mean temperature
51 shall not exceed 0.27 Btu-in./(hr-sf-°F).

52
53 Factory-Applied Jacket for Mineral Fiber Insulation: Jacket and tape shall comply with ASTM C 1136, Type
54 II, as follows:

55
56 FSP Jacket: Jacket consisting of aluminum foil, fiberglass-reinforced scrim with polyethylene
57 backing.

58
59 FSK Jacket: Jacket consisting of aluminum foil, fiberglass-reinforced scrim with kraft-paper
60 backing.

1 Jacket Tape: Seams and tears/damage to jacket shall be sealed with foil-face, vapor-retarder type
2 tape matching the factory-applied jacket, with acrylic adhesive, 3" wide, and not less than 6.5 mils
3 thick.
4

5 Polyisocyanurate Foam Board Insulation: Rigid board material manufactured from closed cell, polyisocyanurate foam
6 between two aluminum foil facers, complying with ASTM C 1289 Type 1, Class 2, with Grade 2 minimum
7 compressive strength.
8

9
10 **JACKETING MATERIAL**

11
12 Insulated indoor ductwork exposed to view shall have field-applied jacket as follows:

13
14 Woven glass-fiber fabric "canvas" of approximately 8 oz./sq. yd. Cover fabric with one coat of fire retardant
15 coating prior to finish painting.
16

17
18 **PART 3 - EXECUTION**

19
20
21 **INSULATION APPLICATION**

22
23 Indoor ductwork shall be insulated as follows:

24
25 Ductwork exposed to view shall. shall be insulated with 2" thick mineral fiber board insulation.
26

27 Concealed ductwork shall be insulated with 2" thick mineral fiber blanket insulation except 6" wide board
28 insulation at trapeze hangers.
29

30 Insulate the following ductwork and plenums:

31
32 Supply air, including back side of air outlets
33 Return air
34

35 Exceptions: Do not insulate the following:

36
37 Flexible connections at fans or equipment
38 Factory-insulated flexible ductwork
39
40

41 **GENERAL INSTALLATION REQUIREMENTS**

42
43 Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids
44 throughout the length of ducts and fittings.
45

46 Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system
47 as specified in insulation system schedules.
48

49 Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not
50 corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
51

52 Install insulation with longitudinal seams at top and bottom of horizontal runs.
53

54 Install multiple layers of insulation with longitudinal and end seams staggered.
55

56 Keep insulation materials dry during application and finishing.
57

58 Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by
59 insulation material manufacturer.
60
61

1 Install insulation with least number of joints practical.

2
3 Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and
4 other projections with vapor-barrier mastic.

5
6 Install insulation continuously through hangers and around anchor attachments. Extend insulation on anchor legs
7 from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to
8 structure with vapor-barrier mastic.

9
10 Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive
11 or sealing compound recommended by insulation material manufacturer.

12
13 Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film
14 thicknesses.

15
16 Install insulation with factory-applied jackets as follows:

17
18 Draw jacket tight and smooth.

19
20 Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket.

21
22 Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

23
24 Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap.
25 Staple laps with outward clinching staples along edge at 2 inches o.c. Tape laps with 3" wide foil tape.

26
27 For below ambient services, apply vapor-barrier mastic over staples.

28
29 Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to
30 maintain vapor seal. Apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges
31 and fittings.

32
33 Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

34
35 Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal
36 movement.

37
38 Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4
39 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

40 41 42 **INSTALLATION AT PENETRATIONS**

43
44 Interior Wall and Partition Penetrations, Not Fire Rated: Install insulation continuously through walls and partitions.

45
46 Fire-Rated Wall, Partition, and Floor Penetrations: Terminate insulation at fire damper sleeves for fire-rated wall and
47 partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at
48 least 2 inches. Comply with requirements 019913 for firestopping and fire-resistive joint sealers.

49 50 51 **INSTALLATION OF MINERAL FIBER INSULATION**

52
53 Blanket Mineral Fiber Insulation Installation: Secure with adhesive and insulation pins, as follows:

54
55 Apply adhesives according to manufacturer's recommended coverage rates per unit area of duct and
56 plenum surfaces.

57
58 Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

1 Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld
2 pins on sides and bottom of horizontal ducts and sides of vertical ducts. **Adhesive secured pins are**
3 **prohibited.** Pins shall be installed as follows:

4
5 On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of
6 duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.

7
8 On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3
9 inches maximum from insulation joints. Install additional pins to hold insulation tightly against
10 surface at cross bracing.

11
12 Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.

13
14 Do not overcompress insulation during installation.

15
16 Impale insulation over pins and attach speed washers.

17
18 Cut excess portion of pins extending beyond speed washers or bend parallel with insulation
19 surface.

20
21 Cover exposed pins and washers with 3" long piece of 3" wide foil continuous vapor barrier tape.

22
23 **For ducts and plenums with surface temperatures below ambient, install a continuous unbroken**
24 **vapor barrier.** Create a facing lap for longitudinal seams and end joints with insulation by removing 2
25 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with
26 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied
27 jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

28
29 Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.

30
31 Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor
32 stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along
33 butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a
34 width equal to two times the insulation thickness, but not less than 3 inches.

35
36 Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure
37 with steel bands spaced a maximum of 18 inches o.c.

38
39 Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface.

40
41 Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

42
43 Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips
44 of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins
45 spaced 6 inches o.c.

46
47 Board Mineral Fiber Insulation Installation: Secure with adhesive and insulation pins in accordance with the
48 requirements for blanket insulation above, with the following modifications:

49
50 For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor
51 barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from
52 one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch
53 outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket,
54 adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

55
56 Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface.
57 Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install
58 insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

59
60
61

1 Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips
2 of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins
3 spaced 6 inches o.c.
4

5

6

7

EXISTING INSULATION REPAIR

8

9

10

Repair damaged sections of existing duct or plenum insulation damaged during this construction period. Use
insulation of same thickness as existing insulation, install new jacket lapping and sealed over existing.

11

12

END OF SECTION 230713

SECTION 233100 – HVAC DUCTWORK

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

NFPA Compliance:

Comply with NFPA 90A, *Standard for the Installation of Air Conditioning and Ventilating Systems*.

Comply with NFPA 90B, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems*.

SMACNA Compliance: Fabricate and install all ductwork and ductwork accessories in accordance with *HVAC Duct Construction Standards - Metal and Flexible*.

SUBMITTALS

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Manufacturer's Data: Submit manufacturer's technical product data and installation instructions for ductwork and products.

PART 2 - PRODUCTS

DUCTWORK MATERIALS

Galvanized Sheet Metal: Except as indicated otherwise, fabricate ductwork from galvanized sheet steel complying with ASTM A 653, lockforming quality, with G 90 zinc coating in accordance with ASTM A 653 and mill phosphatized for exposed locations. Stamp gauge and manufacturer's identification on each sheet. Break sheets so that identification is exposed.

Flexible Ducts: Metallic or non-metallic, insulated flexible ductwork complying with UL 181B. Provide 1" thick continuous flexible fiberglass sheath with vinyl vapor barrier jacket.

DUCT FABRICATION

Shop fabricate ductwork in 4, 8, 10 or 12-ft lengths, unless otherwise indicated. Preassemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.

1 Shop fabricate supply, return, and ventilation air ductwork of gauges and reinforcement complying with SMACNA's
 2 *HVAC Duct Construction Standards - Metal and Flexible*, **with the exception that sheet metal less than 24-ga.**
 3 **shall not be used for rectangular duct**, in accordance with the following:
 4

Application	Construction Pressure Class
Return and Ventilation Ductwork	-2" W.G.
Supply Ductwork Downstream of Air Terminal Units	+1" W.G.
Supply Ductwork With Fan Static Pressure Less Than 2.5" W.G.	+2" W.G.
Supply Ductwork with Fan Static Pressure Greater than or equal to 2.5" W.G.	+3" W.G.

5
 6 Shop fabricate exhaust and relief ductwork of the following gauge sheet metal with reinforcement complying with
 7 SMACNA's *HVAC Duct Construction Standards - Metal and Flexible*:
 8

Maximum Diameter or Maximum Rectangular Dimension (inches)	Sheet Metal Gauge
8	24
18	22
30	20
>30	18

9
 10 Elbows/Tees:

11
 12 Radius elbows and tees shall be fabricated as **full radius** elbows with the centerline radius 1.5 times the
 13 duct width.

14
 15 Square throat elbows shall be constructed with double-wall airfoil turning vanes properly spaced for the duct
 16 width. Turning vanes and vane runners shall be constructed in accordance with SMACNA's *HVAC Duct*
 17 *Construction Standards - Metal and Flexible*, Figure 4-3. **Square throat elbows may be used only when**
 18 **the available space is insufficient for use of a full radius elbow.**

19
 20 Perforated Metal Plenum Air Baffles: Construct of 50% free area perforated 304 stainless steel with angle iron
 21 supports and bracing to prevent bulging, rattling, etc. Metal thickness shall be as follows:
 22

Fan Total Static Pressure	Gauge
Up to 4"	22
4" to 6"	20
Above 6"	18

23
 24
 25 **ROUND AND OVAL DUCTWORK**

26
 27 Construction: Construct round and flat oval ductwork in accordance with Section 3 of SMACNA's *HVAC Duct*
 28 *Construction Standards - Metal and Flexible*, complying with the Pressure Class designations hereinbefore specified.
 29 Use spiral lockseam construction for ductwork up to 58" diameter and welded longitudinal seam for larger ductwork,
 30 26 gauge minimum.

31
 32 Exception: Round ducts that connect to air outlets or inlets may be constructed with a snaplock longitudinal
 33 seams complying with Fig. 3.2 of SMACNA's *HVAC Duct Construction Standards - Metal and Flexible*, 26
 34 gauge minimum.

35
 36
 37
 38

PART 3 - EXECUTION

INSTALLATION OF DUCTWORK

Assemble and install ductwork to achieve air-tight operation with no objectionable noise, capable of performing each indicated service. Install each run with minimum number of joints. Align ductwork accurately at connections, within 1/8" misalignment tolerance and with internal surfaces smooth.

Support ducts in accordance with Section 230529 to hold ducts true-to-shape and to prevent buckling. Support vertical ducts at every floor or roof penetration in accordance with Section 230529.

At ends of ducts that are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure fabricated of 6 mil PVC film or other covering that will prevent entrance of dust and debris until time connections are to be completed.

Routing:

Locate ductwork runs, except as otherwise indicated, vertically and horizontally and avoid diagonal runs unless such routing is clearly indicated on the Drawings. Locate runs as indicated by diagrams, details and notations or, if not otherwise indicated, run ductwork in shortest route that does not obstruct useable space or block access for servicing building and its equipment. Coordinate layout with suspended ceiling, lighting, fire suppression systems, and similar finished work.

Hold ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building. Unless indicated otherwise, install duct as high as possible.

Limit clearance to 1/2" where furring is shown for enclosure or concealment of ducts, but allow for insulation thickness, if any. Where possible, locate insulated ductwork for 1" clearance outside of insulation.

Wherever possible in finished and occupied spaces, conceal ductwork from view by locating in mechanical shafts, hollow wall construction, or above ceilings.

Elbows: **Utilize radius elbows for all changes of direction unless specifically indicated otherwise on the drawings or space limitations dictate the use of square throat elbows with turning vanes.** Where square throat elbows with turning vanes are installed, provide a duct access door or panel immediately upstream of each elbow.

Sealing: Ductwork shall be sealed in accordance with SMACNA's *HVAC Duct Construction Standards - Metal and Flexible*, as follows:

Duct Construction Class	Seal Class
+/- 1" W.G. or less	C
+/- 2" W.G.	B
+/- 3" W.G. and greater	A

Testing:

Ductwork indicated to be constructed in accordance with Pressure Class +/-3" W.G. or greater shall be tested, section by section, in accordance with SMACNA's *HVAC Air Duct Leakage Test Manual*. Air leakage factor (CL), computed in accordance with the following relationship, shall be less than or equal to 6.0:

$$CL = \text{Leakage rate (cfm/100 sf of duct surface)} \times (\text{Test static pressure})^{0.65}$$

Ductwork utilized as part of a smoke control system shall be tested, section by section, in accordance with SMACNA's *HVAC Air Duct Leakage Test Manual* and leakage shall not exceed 5% of design airflow.

1 **INSTALLATION OF FLEXIBLE DUCTS**

2
3 Flexible duct shall only be allowed where indicated on the drawings, installed as follows:

4
5 Install duct fully extended; do not install in the compressed state or use excess lengths.

6
7 Avoid bending ducts across sharp corners or incidental contact with metal fixtures, pipes or conduits. Radius
8 at center line of bends shall not be less than one duct diameter.

9
10 All connections, joints and splices should be made in accordance with the manufacturer's installation
11 instructions.

12
13 All tapes, mastics and non-metallic fasteners (plastic clamps) used for field installation of flexible ducts
14 should be listed and labeled to UL 181B.

15
16 Sheet metal collars to which flexible ducts are attached should be a minimum of 2 inches in length and shall
17 be beaded.

18
19 Sheet metal sleeves used for joining two sections of flexible duct should be a minimum of 4 inches in length
20 and beaded on both ends.

21
22 Maximum Length: **Do not exceed 8'-0" extended length.**

23
24 Metal Duct Connection: Spin-in conical connectors with integral balancing damper shall be used for connecting
25 flexible runouts to metal ductwork.

26
27 Ceiling Diffuser Connections: Connect flexible duct to supply air diffusers in accordance with SMACNA's *HVAC Duct*
28 *Construction Standards - Metal and Flexible*, Figure 7-7, and as indicated on the Drawings.

29
30
31 **ADJUSTING AND CLEANING**

32
33 Clean ductwork internally, section by section, as it is installed, of dust and debris. Clean external surfaces of foreign
34 substances that might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with
35 painting or cause paint deterioration for all new and existing ductwork in project area. After cleaning, seal open ends
36 and connections with 6 mil PVC film.

37
38 Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.

39
40
41 **OWNER INSTRUCTION AND TRAINING**

42
43 Provide Owner instruction and training in accordance with Section 019926.

44
45
46 **END OF SECTION 233100**

SECTION 233300 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

UL Compliance:

Construct, test, and label fire dampers in accordance with UL Standard 555, *Standard for Fire Dampers*.

Construct, test, and label smoke and combination fire/smoke dampers in accordance with UL Standard 555S, *Standard for Smoke Dampers*.

Construct, test, and label ceiling radiation dampers in accordance with UL Standard 555C, *Standard for Ceiling Dampers*.

NFPA Compliance: Comply with applicable provisions of NFPA 90A and/or NFPA 90B pertaining to installation of ductwork accessories.

AMCA Compliance:

Test and rate airflow dampers in accordance with ANSI/AMCA Standard 500-D, *Laboratory Methods of Testing Dampers for Rating*.

Test and rate louvers in accordance with AMCA Standard 500-L, *Laboratory Methods of Testing Louvers for Rating*.

SUBMITTALS

General: Submittals shall demonstrate compliance with technical requirements by reference to each subsection of this specification. Where a submitted item does not **comply fully** with each and every requirement of the Specifications, the submittal shall clearly indicate such deviations. Identification requirements for non-complying features of items are very specific. See Section 019913 for exact requirements.

Manufacturer's Data: Submit manufacturer's technical product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction, and installation instructions. Provide specific instructions for installation of fire and smoke dampers to comply with listed installation arrangement.

PART 2 - PRODUCTS

AIRFLOW DAMPERS

Low Pressure Manual (Balancing) Dampers:

Construction: Dampers installed in dishwasher exhaust ductwork, return air ductwork in natatoriums, and in other wet locations shall be constructed of Type 316 stainless steel, including shafts and hardware exposed to the airstream. All other dampers shall be constructed of G90 galvanized steel with zinc-plated shafts and hardware exposed to the airstream. Single blade or multiblade volume damper shall be constructed in accordance with SMACNA's *HVAC Duct Construction Standards - Metal and Flexible*, Figures 7-4 and 7-5.

1 Quadrant Locks: Provide each low pressure balancing damper with a quadrant lock device on one end of
2 shaft, and end bearing plate on other end for damper lengths over 12". Provide extended quadrant locks
3 and end extended bearing plates for externally insulated ductwork.
4

5

6

7

8

9

PART 3 – EXECUTION

10

OWNER INSTRUCTION AND TRAINING

11

Provide Owner instruction and training in accordance with Section 019926.

12

13

14

END OF SECTION 233300

The interior portions of wall grilles and registers, including connecting duct, which are exposed to view, shall be painted flat black. Interior portion of ceiling diffusers shall be of the same color as the diffusers and accessories shall be flat black.

Manufacturer's model numbers specified herein are intended for ease of identification and comparison. Equivalent products by manufacturers other than those listed, equal in appearance and performance, may be acceptable upon review by A/E.

Unless indicated otherwise on the Drawings, all registers, grilles, and diffusers shall be steel construction.

Exception: Registers, grilles, and diffusers located in wet areas, including but not limited to bathrooms and toilets, etc. shall be aluminum construction.

Rectangular Louvered Face Ceiling Diffuser (**Type-B**): Louvered full face diffuser with round neck that is adjustable horizontal to vertical, constructed of 24 gauge steel or aluminum, as indicated on the Drawings, and finished with baked white enamel unless otherwise noted. Frame style shall match ceiling types(s). Diffuser shall be as follows:

Manufacturer	Steel Construction Model No.	Aluminum Construction Model No.
Titus	TMSA	TMSA-AA
Tuttle & Bailey	1300A	A1300A
Price	SCDA	ASDA
Nailor	RNSA	ARNSA

Plenum Slot Diffusers (**Type-D**): Plenum slot diffusers with insulated sheet metal plenum, number and width of slots as scheduled or required to meet performance criteria (minimum of 2 slots), lengths as scheduled or indicated in plan, adjustable pattern controllers, constructed of heavy gauge aluminum and finished baked white enamel unless otherwise indicated. Frame style shall match ceiling type(s). Provide opposed blade damper in duct. Diffuser shall be Titus model ML-Series, Tuttle & Bailey model APPS or ITPS, Price SDS series, Nailor 5800 series, or equivalent.

Airfoil Blade Sidewall Supply Register and/or Grille (**Type-G**): Supply register and/or grille that is adjustable double deflection type with horizontal front airfoil blades, frame constructed of 20 gauge steel or 0.05" thick aluminum as indicated on the Drawings and finished baked white enamel unless otherwise noted. Blades shall be spaced 5/8" – 3/4" apart. Frame style shall match surface type(s). Register or grille shall be as follows:

Manufacturer	Steel Construction Model No.	Aluminum Construction Model No.
Titus	272RL	272FL
Price	22 (SF Border)	22
Nailor	71DH	71DH

Standard Blade Sidewall Return or Exhaust Register and/or Grille (**Type-V**): Return and exhaust register and/or grille that is single deflection type with fixed horizontal blades at 35-40 degrees, constructed of 20 gauge steel, 0.05" thick aluminum, or 20 gauge Type 316 stainless steel as indicated on the Drawings and finished baked white enamel unless otherwise noted. Blades shall be spaced 5/8" – 3/4" apart. Frame style shall match surface type(s). Register and/or grille shall be as follows:

Manufacturer	Steel Construction Model No.	Aluminum Construction Model No.	Stainless Steel Construction Model No.
Titus	350RL	350FL	350RL-SS
Tuttle & Bailey	T70D	A70D	T70DSS
Price	530	630	730
Nailor	6145H	5145H	6745H

1 Perforated Face Register or Grille (**Type-Z**): Perforated panel face diffuser with adjustable louver vanes, hinged flush
2 face, backpan and interior painted flat black. Register/grille shall be constructed of 26 gauge steel or aluminum as
3 indicated on the Drawings and finished baked white enamel unless otherwise noted. Frame style shall match ceiling
4 type(s). Register or grille shall be as follows:
5

Manufacturer	Steel Construction Model No.	Aluminum Construction Model No.
Titus	PAR	PAR-AA
Tuttle & Bailey	PG	APG
Price	PDDR	APDDR
Nailor	4360	4360AA

6
7
8 **PART 3 - EXECUTION**
9

10
11 **INSTALLATION**
12

13 Locate ceiling air diffusers, registers, and grilles as indicated on general construction "Reflected Ceiling Plans."
14 Unless otherwise indicated, locate units in center of acoustical ceiling modules.
15

16 Install diffusers, registers, and grilles in full accordance with the manufacturer's recommendations. **Modifications in**
17 **ductwork, accessories, and arrangement from that indicated on the Drawings, but required for integration of**
18 **the diffusers, registers and grilles proposed into the system as designed shall be the responsibility of the**
19 **Contractor.**
20

21 Unless indicated otherwise on the Drawings, registers, grilles, and diffusers shall be provided with balancing dampers
22 located at the branch duct connection, not at the air distribution device. Where a balancing damper is indicated at the
23 register, grille, or diffuser, it shall be a rectangular opposed blade damper for installation in square or rectangular
24 necks or a radial opposed blade damper for installation in round necks. **The use of butterfly dampers or horizontal**
25 **radial dampers at air distribution devices is prohibited.**
26
27

28 **OWNER INSTRUCTION AND TRAINING**
29

30 Provide Owner instruction and training in accordance with Section 019926.
31
32

33 **END OF SECTION 233713**

SECTION 260000 - SUMMARY OF ELECTRICAL WORK

Engineer of Record for electrical work is Addison M. Dee, PE, Salas O'Brien, 1620 Midtown Place (27609), P. O. Box 19944, Raleigh, NC 27619. Electrical work shall be defined by drawings numbered with the prefix "E", the general provisions of the Contract including General Conditions and Supplementary Conditions, Division 1 Specifications sections, and Division 26-28 Technical Specifications listed below. In addition, electrical work may be defined by reference to other documents from any of the above-named sources as well as by project addenda.



DIVISION 26 - ELECTRICAL

Section	Title
260000	Summary of Electrical Work
260500	Basic Electrical Requirements
260519	Secondary Voltage Wires and Cables
260526	Grounding
260529	Supporting Devices
260533	Electrical Identification
260534	Raceways
260535	Electrical Boxes and Fittings
260800	Testing and Placing in Service
260923	Lighting Control Devices
262726	Wiring Devices
262816	Enclosed Switches and Circuit Breakers
265100	Interior Lighting Fixtures

DIVISION 27 - COMMUNICATIONS

Section	Title
272000	Telephone/Data Systems Appalachian State University Communications Standards

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Section	Title
283110	Fire Alarm System Modifications Record of Completion Form

END OF SECTION 260000

1 Wiring: Cable, raceways, fittings, mechanical supports, wire, junction boxes, device boxes, outlet boxes, switches,
2 cutouts, and related items.
3

4
5 **PART 2 – PRODUCTS (NOT USED)**
6

7
8 **PART 3 - EXECUTION**
9

10
11 **ENERGIZED SYSTEM WARNING**
12

13 Extreme caution is enjoined with regard to work with and around energized electrical equipment. The Contractor is
14 urged to coordinate all such activities with the Owner or the local electric utility so that electrical equipment may be
15 de-energized as required to safely perform necessary construction activities as defined in the Drawings and
16 Specifications. Suitable OSHA approved lockout-tagout procedures shall be used when circuits or equipment have
17 been de-energized for the purpose of performing construction activities. All work practices related to worker safety
18 are the complete responsibility of the Contractor.
19

20
21 **DUTIES OF CONTRACTOR**
22

23 The Drawings are generally diagrammatic in nature and are neither intended to show each fitting, box, elbow, offset,
24 hanger, *etc.*, nor a complete detail of all work to be done. The Drawings are for the purpose of illustrating the type of
25 system, showing raceway sizes, *etc.*, and special conditions considered necessary for the experienced mechanic to
26 take off materials and lay out work. This Contractor shall be responsible for taking such measurement as may be
27 necessary at the job and adapting his work to local conditions.
28

29 Contractor shall furnish and install all materials called for or reasonably implied in these Specifications and
30 accompanying Drawings. Apparatus must be furnished complete and ready for operation in every respect. Materials
31 and equipment called for in the Specifications and not indicated on the Drawings, or indicated on the Drawings and
32 not called for in the Specifications, shall be furnished by the Contractor.
33

34 Contractor is responsible for familiarizing himself with the project area and details of the construction of building.
35 Work performed under these Specifications that is installed improperly or which requires modification due to improper
36 reading or interpretation of building plans shall be corrected or otherwise modified as directed by the A-E without
37 additional cost to the Owner.
38

39 Contractor shall follow Drawings in laying out work and shall refer to drawings of other trades to verify exact spaces in
40 which work will be installed. Arrange installed items in such a manner as to maintain maximum headroom and space
41 conditions at all points. Where headroom or space conditions appear inadequate, A-E shall be notified before
42 proceeding with installation.
43

44
45 **INSPECTIONS**
46

47
48 The contractor shall schedule inspections with the State Electrical Inspector through the State Construction
49 Office (SCO), Consulting Services section. This shall include all inspections of concealed work, interior and
50 exterior, as well as intermediate and final reviews. All scheduling of electrical inspections with the SCO
51 electrical inspector shall be Monday thru Friday unless specifically exempted and approved by SCO.
52

53
54 **COOPERATION WITH OTHER TRADES**
55

56 The Contractor shall give full cooperation to other trades and shall furnish any and all information necessary to permit
57 the work of other trades. Information to be provided by the Contractor includes, but is not limited to templates,
58 patterns, setting plans, and shop details as may be necessary for the proper installation of work and for the purpose
59 of coordinating adjacent work. Information required by other trades shall be provided in a timely manner and shall be
60 sufficient to allow the work of such other trades to proceed with the least possible interference or delay.
61

1 Where the work of the Contractor will be installed in close proximity to, or may interfere with work of other trades, the
2 Contractor shall assist in working out space conditions to make a satisfactory adjustment. **If the Contractor installs**
3 **his work before coordination with other trades, he shall make the necessary changes in his work to correct**
4 **the condition without extra charge.**

5
6 Scaled Shop Drawings: If so directed by the A-E, the Contractor shall prepare composite working drawings
7 and sections at a suitable scale not less than 3/8"=1'-0", clearly showing how his work is to be installed in
8 relation to the work of other trades.
9

10 11 **SAFETY REQUIREMENTS**

12
13 All systems shall be installed so as to operate in a safe manner; all moving parts shall be covered where there is any
14 possibility of danger from such moving parts. All rough edges of equipment and materials shall be made smooth.
15

16 All safety controls shall be checked under the supervision of the Owner's representative and two (2) copies of test
17 data showing setting and performance of safety controls shall be submitted to the A-E by the Contractor.
18

19 During the construction the Contractor shall keep the site reasonably clean of debris and upon completion of
20 construction he shall clean up the premises to remove all evidence of his work. The Contractor shall provide, at no
21 additional cost to the Owner, additional cleaning of the site as directed by the Owner. In addition, upon completion of
22 construction, he shall clean, wash and/or polish all fixtures, equipment and exposed material and leave each item
23 clean, bright, and without blemish. Damaged items shall be replaced or repaired in a manner satisfactory to the
24 Owner by the Contractor at no additional cost to the Owner.
25

26 It shall be the responsibility of the Contractor to maintain a safe working environment at all times and to comply with
27 all OSHA regulations for the duration of the project.
28

29 30 **SUBMITTALS**

31
32 Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal
33 requirements are defined in each section of this Division.
34

35 Manufacturer's Data: Submit manufacturer's technical product data.
36
37

38 **NAMEPLATE DATA**

39
40 Each item of electrical utilization equipment shall be provided with a permanent operational data nameplate that shall,
41 as a minimum, indicate the following: equipment manufacturer, product name, model number, serial number,
42 capacity, voltage requirements, and either full load current or full load volt-amperes. Labels of tested compliances
43 and similar essential data shall be a part of this label or located nearby. All equipment nameplates shall be in an
44 accessible location.
45

46 In the event that the installation of equipment renders the manufacturer's nameplate inaccessible, the above
47 information shall be etched onto a laminated plastic nameplate securely fastened to the equipment by no less than
48 two machine screws or by other fastening methods approved by the A-E.
49

50 51 **ACCESSIBILITY**

52
53 Contractor shall be responsible for the sufficiency of the size of shafts and chases and the adequate clearance in
54 double partitions and hung ceilings for the proper installation of his work. He shall cooperate with all other trades
55 whose work is in the same place and shall advise the General Contractor of his requirements. Such spaces and
56 clearances shall be kept to the minimum size required for such installations.
57
58

1 Contractor shall locate all equipment that must be serviced, operated, or maintained in fully accessible positions and
2 shall coordinate with other trades as necessary to meet the workspace requirements of the National Electrical Code.
3 Equipment where such space is required includes switchboards, motor control centers, panelboards, fire alarm
4 control panels, telephone and data terminal panels and cabinets, and similar items.

5
6 Minor deviations from Drawings may be made to allow improved accessibility. Submit requests for all changes to the
7 A-E for approval. Relocation of equipment, should such be required to meet NEC workspace requirements, shall be
8 made by the Contractor at no additional cost.

9
10
11 **CONCEALED RACEWAY**

12
13 In general, all raceway or cable wiring methods in finished spaces shall be run concealed in walls, partitions,
14 structural concrete panels, or above ceilings.

15
16 Exterior Raceway: Raceway may not be routed on exterior surfaces of the building or across a building roof
17 (either above, below, or within roof insulation) unless specifically indicated on the Drawings.

18
19 Raceway Below Concrete Floor Slabs: Raceway may not be routed below concrete floor slabs unless such
20 is specifically shown on the Drawings.

21
22 Concealment of raceway and covering of same shall not be done until authorized by the Authority Having Jurisdiction
23 (AHJ). This applies to all interior work and exterior work.

24
25
26 **SLEEVES AND PLATES**

27
28 Contractor shall provide and locate all sleeves and inserts required, or shall be responsible for the cost of cutting and
29 patching required where sleeves and/or inserts were not installed, or where incorrectly located. The Contractor shall
30 be responsible for all drilling required for the installation of his hangers.

31
32 Sleeves shall be provided for all raceway passing through concrete, masonry, or tile wall, floor, or overhead deck
33 construction. Sleeves shall be constructed of Schedule 40 black steel pipe unless otherwise indicated on Drawings.
34 Sleeves through concrete beams shall be constructed as indicated on Drawings.

35
36 Fasten sleeves securely in walls so that they will not become displaced when other construction is built around them.
37 Take precautions to prevent concrete, plaster, or other materials being forced into the space between raceway and
38 sleeve during construction.

39
40 Escutcheon plates shall be provided for all exposed (where permitted) raceway passing through walls and ceilings.
41 Plates shall be nickel plated, of the split ring type, of size to match the raceway. Where plates are provided for pipes
42 passing through sleeves that extend above the floor surface, provide deep recessed plates to conceal the pipe
43 sleeves.

44
45
46 **SUPPORTS, ATTACHMENTS**

47
48 Contractor shall furnish and install all necessary supports required for all electrical equipment, lighting fixtures,
49 raceway, outlet boxes, panelboards, generators, and for all other equipment furnished under this contract, and shall
50 submit drawings to the A-E for approval before purchase, fabrication, or construction of same.

51
52 All equipment, unless otherwise shown, shall be securely attached to the building structure in an approved manner.
53 Attachments shall be of a strong and durable nature; any attachments that are deemed by the A-E to be insufficient
54 due to reasons of strength, location, quality, or appearance shall be replaced as directed at no additional cost to the
55 Owner.

56
57 Framing members shall be standard rolled steel shapes, ASTM A36 steel, except that members welded to main
58 structural member shall be of the same specification as the main structural member.

1 Framing shall be "simple beam" type with end connections welded or bolted for shear loads. Cantilevers may be
2 used when detailed or specifically approved. Location of supplementary framing shall be subject to approval.
3 Welding, where required, shall be performed by certified welders.
4

5 Framing members shall be designed for their actual loads with allowable stresses set forth in the AISC Specifications
6 and the AISC Code, without excessive deflection and with consideration for rigidity under vibration, in accordance
7 with standard structural practices. Supplementary framing, including design loads, member size and location shall be
8 clearly shown on shop drawings.
9

10 When supplementary framing is indicated, verify that dimensions are suitable and that framing is structurally
11 adequate for the equipment furnished.
12
13

14 **FIRE RATED CONSTRUCTION**

15
16 The fire rating of all floors, ceilings, and partitions shall be maintained. It is the responsibility of this Contractor
17 provide and install any necessary fire resistive components so that the fire integrity of all fire rated structures
18 supporting or containing items required under Divisions 26-28 will not be diminished by the installation of such items.
19 Where device or junction boxes penetrate any fire rated structure, the boxes shall be located in such a manner as not
20 to reduce the fire rating of the structure. Where the Drawings indicate adjacent boxes or devices in rated partitions
21 that would reduce the fire rating of the partition if unprotected, suitable Listed protection methods shall be used to
22 insure the fire rating of the partition will not be decreased by the proximity of other boxes or penetrations.
23

24 Where recessed fixtures are used in fire rated ceilings, suitable construction shall be installed above and around the
25 fixture so that the fire rating of the ceiling is maintained. Refer to Architectural Drawings for fire ratings of ceilings.
26

27 Where recessed panelboards, recessed cabinets, or other items are located in a fire rated partition, suitable
28 construction behind and around the item shall be used to maintain the fire rating of the partition.
29

30 Where fire resistive insulation or other coverings have been applied to a structure or to structural elements to obtain a
31 fire rating and this insulation or covering is removed or otherwise disturbed by the installation of Division 26-28
32 components or other related items, this Contractor shall be responsible for restoring the material to a condition that
33 matches the original fire protective ability.
34

35 Approval must be obtained from the A-E before any boxes, devices, or other components are relocated for the
36 purpose of maintaining fire ratings.
37
38

39 **TESTING LABORATORY APPROVAL**

40
41 All equipment shall be approved for the intended use and shall be Labeled or Listed. In any case where the suitability
42 for a particular application is in question by the A-E or inspection authorities the Contractor shall furnish appropriate
43 standards covering the specific piece of equipment in question. Such standards, if required, shall be requested by
44 the A-E in writing and shall be furnished by the Contractor at no additional cost.
45
46

47 **PERSONNEL GROUND FAULT PROTECTION**

48
49 Personnel ground fault protection is to be provided for certain receptacles as indicated on the Drawings and/or as
50 required by the National Electrical Code. Protection is to be provided by the use of GFCI receptacles; the use of
51 GFCI circuit breakers is not acceptable for the protection of general use receptacles. GFCI receptacles may not be
52 used to protect other downstream non-GFCI receptacles unless specifically indicated on the Drawings.
53

54 If required, use GFCI circuit breakers to protect equipment or dedicated receptacles in locations as indicated on
55 Drawings or panel schedules. GFCI receptacles may not be used to protect downstream circuit components.
56
57
58
59

1 **TYPICAL MOUNTING HEIGHTS OF DEVICES**

2
3 Typical mounting heights for electrical equipment shall be as follows unless otherwise noted on Drawings:

4

DEVICE	MOUNTING HEIGHT ABOVE FINISHED FLOOR (AFF)	TO
Toggle Switches	3'-6"	Center Line
Receptacles	1'-6"	Center Line
Telephone Outlets	1'-6"	Center Line
Data Outlets	1'-6"	Center Line

5
6 **SCAFFOLDING, RIGGING, HOISTING**

7
8 The Contractor shall furnish all scaffolding, rigging, hoisting and related sub-contract services necessary for
9 equipment delivery and final placement as indicated on the Drawings.

10
11 All scaffolding, rigging and hoisting equipment shall be removed from the job site in a timely manner when such
12 equipment is no longer required.

13
14
15 **ELECTRICAL CIRCUITS**

16
17 Circuit designations and connections are shown on the Drawings. Indicated circuit numbers and circuit breaker
18 positions are mandatory unless changes are specifically approved by the A-E in writing.

19
20 Electrical neutral connections are indicated on the Drawings. Neutrals may not be reconfigured or otherwise changed
21 without specific approval in writing from the A-E.

22
23 Request for circuit or neutral changes **can not be a part of the equipment submittal process.**

24
25
26 **EQUIPMENT CONNECTIONS**

27
28 In general, provide complete electrical power supply system connections to all equipment shown on Drawings. In
29 addition, provide disconnection and re-connection to the power system of any items that are indicated on the
30 Drawings as being moved or relocated.

31
32 Control wiring shall be installed in raceways and box system separate from power wiring, unless otherwise indicated
33 on Drawings. Wiring within equipment enclosures shall be in raceways provided under this section of the
34 Specifications unless approved raceway is provided by the manufacturer of the equipment or unless the equipment is
35 listed for use as a raceway.

36
37
38 **ELECTRICAL PROVISIONS FOR DIVISIONS 21 - 23**

39
40 Division 26-28 Contractor shall provide complete power wiring to a disconnecting means provided under Division
41 supplying the equipment. Extension of power from the disconnecting means to the utilization equipment shall be
42 made under the Division supplying the equipment.

43
44 Starters, contactors, and similar control equipment shall be furnished and installed by other divisions unless
45 specifically shown on the electrical Drawings. Control wiring is furnished by the Division supplying the control
46 equipment.

47
48 Fuses for fused disconnects are furnished and installed by the division supplying the equipment to be protected.

49
50 Refer to Sections 220511, ELECTRICAL PROVISIONS FOR PLUMBING WORK and/or 230511, ELECTRICAL
51 PROVISIONS FOR HVAC WORK for a complete description and breakdown of the responsibility of each trade
52 (Divisions 20-23 and Divisions 26-28).

53
54
55 **END OF SECTION 260500**

1 Type XHHW: For general use as exterior feeders and service entrance conductors, as conductors in all
2 underground raceway, as conductors in wet locations and as specifically indicated on the Drawings;
3 maximum operating temperature 90° C (194° F). Insulation, moisture and heat-resistant cross-linked
4 polymer; conductor, annealed copper.

5
6 Building wire shall be installed in raceway for all applications. Cables are not approved for use in this project under
7 Division 26.

8
9 Connectors:

10
11 General: Provide factory-fabricated, metal connectors of sizes, ampacity ratings, materials, types and
12 classes for applications and for services indicated. Where not indicated, provide proper selection as
13 determined by Installer to comply with project's installation requirements, NEC and NEMA standards. Select
14 from the following, those types, classes, kinds and styles of connectors to fulfill project requirements:

15
16 Type: Pressure, threaded

17
18 Class: Insulated

19
20 Kind: Copper (for Cu to Cu connection)

21
22 Style: Wirenut, wingnut, power distribution block

23
24 Use power distribution blocks or other splicing device having a minimum of one clamping screw per
25 conductor where conductor size or quantity exceed limits for "wirenut" or "wingnut" type connectors.

26
27 Provide power distribution blocks that are attached to the gutter, box, or enclosure into which they
28 are installed. Free-floating, unattached power distribution blocks are not acceptable.

29
30 Provide suitable insulating covers for all connection devices where such insulation is not a part of
31 the device design.

32
33 Use of split bolt connectors, insulation piercing connectors, or tape as a means of insulating connection
34 devices is not acceptable.

35
36
37 **PART 3 - EXECUTION**

38
39
40 **INSTALLATION OF WIRES AND CABLES**

41
42 General: Install wires and wiring connectors as indicated, in compliance with applicable requirements of NEC,
43 NEMA, UL, and NECA's "Standard of Installation," and in accordance with recognized industry practices.

44
45 Coordinate wire/cable installation work including electrical raceway and equipment installation work, as necessary to
46 properly interface installation of wires/cables with other work.

47
48 Circuits of size #8 AWG and larger shall have Class B stranded conductors.

49
50 Power and lighting circuits #10 AWG and smaller shall have solid conductors. The minimum size for all power and
51 lighting circuits shall be #12 AWG.

52
53 Control wiring shall have stranded conductors and a minimum size of #14 AWG.

54
55 Maximum size for feeders and service conductors shall be 500 kcmil.

1 Increase Drawing indicated size of conductors for ampacity and temperature rating as described below:

2
3 Conductor sizes shown on Drawings are based on the use of terminations Listed and Labeled for use at 75°
4 C. (167° F.). Where terminations are not Listed and Labeled for use at 75° C. (167° F.), the Contractor shall
5 increase the size of the conductor as required to meet the temperature rating of the conductor in accordance
6 with NEC Article 110.14(c). Conductor size increases required under this section shall be made without
7 additional cost.

8
9 Increase Drawing indicated size of conductors for voltage drop as follows:

10
11 Use #10 AWG conductor for 20 Ampere, 120 Volt branch circuit home runs longer than 50 feet, unless
12 otherwise noted on Drawings.

13
14 Use #10 AWG conductor for 20 Ampere, 277 Volt branch circuit home runs longer than 100 feet, unless
15 otherwise noted on Drawings.

16
17 Conduit runs shall contain the number of phase conductors shown on the plans. A dedicated neutral shall be
18 installed for each phase conductor served by single pole, 120 and 277 Volt, 20 Amp circuit breakers. Multi-pole
19 circuit breakers serving 120 and 277 Volt, 20 Amp multi-wire branch circuits with a common neutral shall not be
20 permitted. Conduits runs shall contain related grounding and/or isolated grounding conductors.

21
22 Conduit runs that contain more than one neutral shall have each neutral conductor uniquely identified at
23 each termination, splice and where routed through junction or pull boxes. Neutral conductors containing a
24 factory applied, trace line along the length that matches the color of the associated phase conductor shall be
25 used to meet this requirement. Machine printed labels with the panel and associated circuit number shall
26 also be permitted for identifying neutral conductors. Colored tape and pre-printed tags shall not be
27 acceptable.

28
29 Feeders and/or branch circuits shall not be combined either with each other or one with another into junction
30 boxes, pull boxes, device boxes, manholes, or other common routing unless such routing is specifically
31 indicated on the Drawings.

32
33 Neatly train wiring inside boxes, equipment and panelboards; Avoid bundling conductors with lacing or cable ties so
34 that generated heat may be more easily dissipated.

35
36 Conduit runs indicated on the Drawings as composed of parallel runs of conductors shall be made identical with
37 respect to length, conduit size, wire type, insulation type, routing, and terminations at each end.

38
39 Conductors Shall Be Color Coded as Follows:

40
41 Grounding Conductors: Green

42
43 Isolated Grounding Conductors: Green with yellow tracer

44
45 Grounded Neutral Conductors: White for 120 V systems, gray for 277 V systems

46
47 Ungrounded Phase Conductors for 208Y/120V Systems: Black (phase A), red (phase B), and blue (phase
48 C)

49
50 Ungrounded Phase Conductors for 480Y/277V Systems: Brown (phase A), orange, (phase B) and yellow
51 (phase C)

52
53 Switch Leg Travelers: Violet

54
55 Provide other wire colors as indicated on the Drawings.

56
57 Remarking of insulation colors by use of colored marker tape shall be permitted only as allowed by the NEC.

1 Install exposed cables (where permitted) parallel and perpendicular to surfaces, or exposed structural members.
2 Cables shall follow surface contours, where possible.

3
4 Completely and thoroughly swab raceway system before installing conductors.

5
6 Branch circuit wiring shall not loop through receptacle terminals, but shall be connected by means of conductor taps
7 joined to branch circuit conductors. At end of run, branch circuit conductors may terminate on receptacle screw
8 terminals. Quick make, clamp, or push-in type terminations may not be used to make connections to devices.

9
10 Position all splices in pull boxes and junction boxes of adequate volume so they are accessible from the removable
11 cover side of the box.

12
13 Conductors for signal systems shall be continuous (without splice) and shall be terminated on terminal strips or
14 terminate in a manner approved by the system's manufacturer.

15
16 All neutrals and ground wires in panels shall be labeled with cloth wire markers to indicate the circuits being served.

17
18 Pull conductors simultaneously where more than one is being installed in same raceway.

19
20 Use pulling compound or lubricant, where necessary; compound used must not deteriorate conductor or insulation.
21 After conductors have been pulled, clean exposed conductors and surrounding area to remove all evidence of the
22 use of pulling compound.

23
24 Use pulling means including fish tape, cable, rope and basket weave wire/cable grips that will not damage cables or
25 raceway.

26
27 Keep conductor splices to a minimum.

28
29 Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than conductors
30 being spliced.

31
32 Use splice and tap connectors that are compatible with conductor material.

33
34 Tighten electrical connectors and terminals, including screws and bolts, in accordance with manufacturer's published
35 torque tightening values. Where manufacturer's torque requirements are not indicated, tighten connectors and
36 terminals to comply with tightening torques specified in UL Standard 486A and B.

37 38 39 **WIRING CONNECTIONS AND TERMINATIONS**

40
41 Splices shall be permitted on conductors up to #4 AWG. No splices shall be permitted on conductor #3 AWG and
42 larger without specific approval in writing by the A-E. Splices shall be made in accessible junction boxes; no splices
43 shall be made in conduit bodies.

44
45 Splices, taps, and attachments of fittings and lugs shall be electrically and mechanically secure. Connectors and lugs
46 shall be proper size and labeled as suitable for the number and type of conductors joined.

47
48 Solid conductors, namely those sized #10 and #12 AWG copper shall be spliced or tapped only by the use of Ideal
49 "Wing-Nuts" or "Wire Nuts", Buchanan's "B-Cap" or 3M Co.'s "Scotchlox" connectors. "Sta-Kon" or other permanent
50 type crimp connectors shall not be used.

51
52 Self-stripping electrical pigtail and tap connectors shall not be used.

53
54 Stranded conductors, namely #8 AWG to #4 AWG, shall be spliced or tapped by approved mechanical connectors.
55 Insulation for splices or taps shall be obtained by the use of Listed insulating covers designed for use with the
56 particular connector. Quality of insulation at splices shall equal that of the conductor insulation in terms of
57 temperature resistance, covering ability and durability.

58
59 Conductors, in all cases, shall be continuous from outlet to outlet, and no splicing shall be made except within outlet
60 or junction boxes, troughs, and gutters. No splices shall be permitted in panel enclosures, disconnects or utilization
61 equipment.

1 Lugs for conductors #8 through #4 AWG shall be copper, with a direct acting screw. Where permitted, lugs for
2 conductors #3 AWG and larger shall be copper, applied directly to the cable by hydraulic pressure. Lugs shall not be
3 split bolt or screw types.

4
5 Tape, where used, shall be made using special oil resistant vinyl plastic tape that is Listed, rated 105° C.

6
7 Splices or taps in grounding conductors (where permitted) in sizes #8 AWG and larger shall be by means of
8 exothermic welding and termination shall be by means of approved grounding connectors. As an alternate,
9 connectors using hydraulic compression tools may be used as a contractor selection option. Solder shall not be used
10 as a means of joining grounding conductors.

11
12 Thoroughly clean wires before installing lugs and connectors.

13
14 Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.

15
16 Terminate spare conductors with electrical tape.

17
18
19 **FIELD QUALITY CONTROL**

20
21 Prior to energizing circuitry, check installed wires and cables with megohm meter to determine insulation resistance
22 levels to insure requirements are fulfilled. Provide additional testing as directed by the A-E in accordance with
23 Section 260800, *TESTING AND PLACING IN SERVICE*.

24
25 Prior to energizing circuitry, test wires and cables for electrical continuity and for short circuits. Verify proper phasing
26 connections.

27
28 Subsequent to wire and cable hook-ups, energize circuitry and demonstrate functioning in accordance with
29 requirements. Where necessary, correct malfunctioning units, and then retest to demonstrate compliance.

30
31
32 **END OF SECTION 260519**

1 **SECTION 260526 - GROUNDING**

2
3 **PART 1 - GENERAL**

4
5
6 **RELATED DOCUMENTS**

7
8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
9 Specification sections, apply to work of this section.

10
11
12 **QUALITY ASSURANCE**

13
14 Manufacturer's Qualifications: Firms regularly engaged in manufacture of grounding and bonding products, of types,
15 and ratings required, and ancillary grounding materials, including stranded cable, grounding rods, and bonding
16 jumpers whose products are Listed and Labeled for their intended usage.

17
18 Codes and Standards:

19
20 Electrical Code Compliance: Comply with applicable State electrical code requirements and the authority
21 having jurisdiction, and NEC as applicable to electrical grounding and bonding, pertaining to systems,
22 circuits and equipment.

23
24 Testing Laboratory Compliance: Comply with applicable requirements of UL Standards No.'s 467,
25 "Electrical Grounding and Bonding Equipment," and 869, "Electrical Service Equipment," pertaining to
26 grounding and bonding of systems, circuits and equipment. In addition, comply with UL Std. 486A, "Wire
27 Connectors and Soldering Lugs for Use with Copper Conductors." Provide grounding and bonding products
28 that are Listed and Labeled for their intended usage.

29
30 IEEE Compliance: Comply with applicable requirements of IEEE Standard 142 and 241 pertaining to electrical
31 grounding.

32
33
34 **SUBMITTALS**

35
36 Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal
37 requirements are defined in each section of this Division.

38
39 Product Data: Submit manufacturer's data on grounding and bonding products and associated accessories.
40

41
42 **PART 2 - PRODUCTS**

43
44
45 **GROUNDING AND BONDING SYSTEMS**

46
47 Materials and Components:

48
49 General: Except as otherwise indicated, provide electrical grounding and bonding systems indicated,
50 assemble materials, including, but not limited to, cables/wires, connectors, solderless lug terminals,
51 grounding rods, bonding jumpers, service arresters, and additional accessories as needed for a complete
52 installation. Where more than one type component product meets indicated requirements, selection is
53 Contractor's option. Where materials or components are not indicated, provide products that comply with
54 NEC and UL requirements and with established industry standards for those applications indicated.

55
56 Conductors: Unless otherwise indicated, provide equipment grounding conductors in all conduit and wiring
57 systems. Grounding conductors shall be insulated by the same type insulation as the ungrounded
58 conductors and sized in accordance with NEC Table 250.122 unless otherwise specified.
59

1 Bonding Connectors, Terminals and Clamps: Provide electrical bonding connectors, terminals, lugs and
2 clamps as recommended by bonding connector, terminal and clamp manufacturers for indicated
3 applications.

4
5 Electrical Grounding Connection Accessories: Provide electrical insulating tape, bonding straps, as
6 recommended by accessories manufacturers for type service indicated.

7
8
9 **PART 3 - EXECUTION**

10
11
12 **EXAMINATION**

13
14 Examine areas and conditions under which electrical grounding and bonding connections are to be made and notify
15 A-E in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory
16 conditions have been corrected.

17
18
19 **INSTALLATION OF ELECTRICAL GROUNDING AND BONDING SYSTEMS**

20
21 General: Install electrical grounding and bonding systems as indicated, in accordance with manufacturer's
22 instructions and applicable portions of NEC, NECA's "Standard of Installation," and in accordance with recognized
23 industry practices to ensure that products comply with requirements.

24
25 Install grounding systems as designed.

26
27 Coordinate with other electrical work as necessary to interface installation of electrical grounding and bonding system
28 work with other work.

29
30 Provide a separate, insulated equipment grounding conductor from each device to ground buses in panelboards.
31 Terminate each end on a grounding lug, bus, or insulated grounding bushing.

32
33 Provide separate insulated equipment grounding conductor, size to be determined from NEC Table 250.122, for each
34 circuit and in each conduit run. The grounding conductor shall be attached by means of a dedicated green screw to a
35 common point in each junction box, cabinet, device box, enclosure, or utilization equipment to which it runs or
36 through which it passes. Grounding methods depending on the continuity of electrical raceway, clips, or mounting
37 screws are not acceptable. This grounding requirement will be rigidly enforced.

38
39 Provide an insulated bonding bushing at boxes, enclosures or cabinets with concentric, eccentric or over-sized
40 knockouts. Terminate equipment grounding conductor by passing the conductor through the terminal of the insulated
41 bonding bushing and then onward to terminate at ground bus or lug.

42
43
44 **END OF SECTION 260526**

1 Conduit Hangers: Hangers shall be galvanized steel used for supporting conduit up to 2". Weight varies with
2 conduit size, up to 25 pounds per 100 units for 2" trade size.

3
4 One-Hole Conduit Straps: One hole conduit straps used for supporting 1/2" conduit (where such is
5 permitted) and 3/4" conduit, shall be galvanized steel. Approximate weight is 7 pounds per 100 units.

6
7 Two-Hole Conduit Straps: Two hole conduit straps, used for supporting conduit larger than 3/4", shall be
8 galvanized steel. Weight varies with conduit size.

9
10 Hexagon Nuts: For 1/2", 3/8" or 1/4" rod sizes, nuts shall be galvanized steel.

11
12 Round Steel Rod: Use black steel for 1/2", 3/8" or 1/4" diameter rod.

13
14 Anchors: Provide anchors of types, sizes and materials indicated, with the following construction features:

15
16 Lead Expansion Anchors: 1/2", approximately 38 pounds per 100 units.

17
18 Toggle Bolts: Springhead type, 3/16" x 4", approximately 5 pounds per 100 units.

19
20 Powder actuated anchors and fasteners are not permitted.

21
22 Watertight Wall and Floor Seals: Provide factory-assembled watertight wall and floor seals of types and sizes
23 indicated. Wall and floor seals shall be suitable for sealing around conduit, pipe, or tubing passing through concrete
24 walls. Construct seals with steel sleeves, malleable iron body, neoprene sealing grommets and rings, metal pressure
25 rings, pressure clamps, and cap screws.

26
27 U-Channel Strut Systems: Provide U-channel strut system for supporting electrical equipment and conduit where
28 runs of more than two conduit must be supported from overhead structure. System shall be 12-gage minimum
29 hot-dip galvanized steel of types and sizes indicated. Use 1 1/2" deep channel to support conduit larger than 1 1/2"
30 trade diameter. Furnish with the following fittings that mate and match with U-channel:

31
32 Channel hangers

33
34 End caps

35
36 Beam clamps

37
38 Wiring studs

39
40 Thinwall conduit clamps

41
42 Rigid conduit clamps

43
44 Conduit hangers

45
46 U-bolts

47
48
49 **FABRICATED SUPPORTING DEVICES**

50
51 Pipe Sleeves: Provide pipe sleeves as follows:

52
53 Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.

54
55 Sleeve Seals: Provide sleeves for piping which penetrates foundation walls below grade, or exterior walls. Caulk
56 between sleeve and pipe with non-toxic, UL classified caulking material to ensure watertight seal.

PART 3 - EXECUTION

INSTALLATION OF SUPPORTING DEVICES

Install hangers, anchors, sleeves and seals as indicated, in accordance with manufacturer's written instructions and with recognized industry practices to insure supporting devices comply with requirements. Comply with requirements of NECA and NEC for installation of supporting devices.

Coordinate with other electrical work, including raceway and wiring work, as necessary to interface installation of supporting devices with other work.

Install hangers, supports, clamps and attachments to support conduit properly from building structure. Arrange for grouping of parallel runs of horizontal conduits to be supported together on trapeze type hangers where possible. Install supports with spacings indicated and in compliance with NEC requirements.

Torque sleeve seal nuts, complying with manufacturer's recommended values. Ensure that sealing grommets expand to form water tight seal.

END OF SECTION 260529

1 Color-Coded Plastic Tape:

2
3 General: Provide manufacturer's standard self-adhesive vinyl tape not less than 3 mils. thick by 1-1/2" wide.
4 Tape shall be listed for use at 105°C. or the temperature rating of the conductors to be marked, whichever
5 is higher.
6

7 Cable/Conductor Identification Bands:

8
9 General: Provide pre-numbered or pre-lettered manufacturer's standard cloth self-adhesive cable/conductor
10 markers of wrap-around type. Printing shall show circuit identification by indicating panel designation and
11 circuit number.
12

13
14 **LETTERING AND GRAPHICS**

15
16 General: Coordinate names, abbreviations and other designations used in electrical identification work, with
17 corresponding designations shown, specified or scheduled. Provide numbers, lettering and wording as indicated or, if
18 not otherwise indicated, as recommended by manufacturer or as required for proper identification and
19 operation/maintenance of electrical systems and equipment.
20

21
22 **WIRE COLOR CODE SCHEDULE**

23
24 Where more than one nominal voltage system exists within a single facility, a schedule of conductor color codes shall
25 be posted at each panelboard that is installed, relocated, renovated, or otherwise modified. The schedule, meeting
26 the requirements of NEC 210.5(C) for branch circuit panelboards, shall be permitted to be either a plastic laminate
27 sign or a printed label with permanent self-adhesive containing the information given in Section 260519,
28 *SECONDARY VOLTAGE WIRES AND CABLES*. The label shall be installed so that it is clearly visible with the
29 panelboard cover removed but with any shields or protective barriers in place. The label shall be installed after the
30 installation of all conductors so that it may be located in an un-observed location.
31

32
33 **PART 3 - EXECUTION**

34
35
36 **APPLICATION AND INSTALLATION**

37
38 General Installation Requirements:

39
40 Install electrical identification products as indicated, in accordance with manufacturer's written instructions,
41 and requirements of NEC.
42

43 Coordination: Where identification is to be applied to surfaces that require finish, install identification after
44 completion of painting.
45

46 Regulations: Comply with governing regulations and requests of governing authorities for identification of
47 electrical work.
48

49 Conduit and Box Identification:

50
51 General: Apply color-coded identification to match system color code on electrical conduit and junction
52 boxes in accordance with the following:
53

54 All empty conduit runs and conduit with conductors for future use shall be identified for such use;
55 identification shall indicate where such conductors or empty conduct terminate. Identification shall be by
56 tags attached to the pull cord or spare conductors. Each end of the pull cord shall be identified.
57
58
59
60
61

1 All outlet boxes, junction boxes and pull boxes, either exposed or concealed, shall have their covers and
2 exterior visible surfaces painted with the field colors described in this section. Boxes shall also be marked to
3 indicate the panelboard and circuit number(s) of the circuits contained within. Lettering may be by hand for
4 concealed or non-public locations only. Machine printed labels are to be used to identify boxes where such
5 are permitted to appear in areas accessible by the public; embossed type plastic labels are not acceptable
6 for use on this project. Where hand produced marking is permitted, the lettering shall be made with
7 waterproof ink.

8
9 Equipment/System Identification:

10
11 General: Install an engraved plastic laminate sign on each major unit of electrical equipment on project.
12 Such equipment includes central or master unit of each electrical system including communication, control,
13 and signal systems, unless unit is specified with its own self-explanatory identification. Except as otherwise
14 indicated, provide single line of text, 1/2" high lettering, on 1-1/2" high sign (2" high where 2 lines are
15 required), white lettering in field color as indicated below. Provide text matching terminology and numbering
16 of the Contract Documents and shop drawings.

17
18 Field Colors shall be the following:

- 19
20 Blue surface with white core for 120/208 Volt equipment.
21 Black surface with white core for 277/480 Volt equipment.
22 Bright red surface with white core for all equipment related to fire alarm system.
23 Dark red (burgundy) surface with white core for all equipment related to security.
24 Green surface with white core for all equipment related to emergency systems.
25 Yellow surface with black core for all equipment related to optional stand-by systems.
26 Yellow surface with red core for all equipment related to legally required stand-by systems.
27 Orange surface with white core for all equipment related to telephone systems.
28 Brown surface with white core for all equipment related to data systems.
29 White surface with black core for all equipment related to paging systems.
30 Purple surface with white core for all equipment related to TV systems.

- 31
32 Panelboards, electrical cabinets and/or enclosures
33 Disconnect or safety switches
34 Contactors, except use adhesive where fasteners should not or cannot penetrate substrate.

35
36 Cable/Conductor Identification (Low Voltage):

37
38 General: Apply cable/conductor identification, including feeder number, on each cable/conductor in each
39 box/enclosure/cabinet where wires of more than one circuit or communication/signal system are present,
40 except where another form of identification (such as color-coded conductors) is provided. Match
41 identification with marking system used in panelboards, shop drawings, contract documents, and similar
42 previously established identification for project's electrical work.
43
44

45 **END OF SECTION 260533**

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

SECTION 260534 - RACEWAYS

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products are Listed and Labeled.

Codes and Standards:

NEMA Compliance: Comply with applicable requirements of NEMA Standards Publications pertaining to raceways.

Testing Laboratory Compliance and Labeling: Comply with applicable requirements of UL safety standards pertaining to electrical raceway systems. Provide raceway products and components that have been Listed and Labeled.

NEC Compliance: Comply with applicable requirements of the latest edition of the NEC pertaining to construction and installation of raceway systems.

SUBMITTALS

Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal requirements are defined in each section of this Division.

Product Data: Submit manufacturer's technical product data, including specifications and installation instructions, for each type of raceway system required. Include data substantiating that materials comply with requirements.

PART 2 - PRODUCTS

METAL CONDUIT AND TUBING

General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thicknesses) for each use indicated. Where types and grades are not indicated, provide proper selection determined by Installer to fulfill wiring requirements as stated herein while complying with applicable portions of NEC for raceways.

Rigid Metal Conduit (RMC): Provide rigid steel, zinc-coated, threaded type conforming to ANSI C80.1 and UL 6. Provide zinc coating fused to inside and outside walls.

Intermediate Metal Conduit (IMC): Provide rigid intermediate grade hot-dip galvanized type conforming to UL 1242.

Electrical Metallic Tubing (EMT): Provide electrical metallic conduit conforming to ANSI C80.3 and UL 797.

Flexible Metal Conduit (FMC): Provide steel flexible metal conduit conforming to UL 1. Conduit shall be formed from continuous length of spirally wound, interlocked zinc-coated strip steel.

- 1 Liquid-Tight Flexible Metal Conduit (LFMC): Provide flexible liquid-tight metal conduit constructed of single
2 strip, flexible, continuous, interlocked, and double-wrapped steel. Inside and outside shall be galvanized;
3 conduit shall be coated with liquid-tight jacket of flexible polyvinyl chloride (PVC).
4
- 5 Rigid Metal Conduit Fittings: Provide cast malleable iron, galvanized or cadmium plated.
6
7 Use Type 1 fittings for raintight connections.
8 Use Type 2 fittings for concrete tight connections.
9
- 10 Conduit Locknuts: Provide case-hardened steel locknuts for use on threaded raceway.
11
- 12 Conduit Bushings:
13
14 Insulated: Provide Listed and Labeled, threaded, thermosetting plastic bushings at each end of all threaded
15 raceway. Provide grounding type if same is indicated elsewhere.
16
17 Grounding (bonding type): Provide Listed and Labeled, threaded, insulated throat, bonding type bushings.
18 Provide steel frame bushings for use on ferrous raceway. Provide bushings with tin-plated copper
19 grounding saddle sized to accept grounding conductor size as indicated on the Drawings. Where grounding
20 conductors are oversized, provide separate copper grounding lugs that are appropriately sized.
21
- 22 Flexible Metal Conduit Fittings: Provide steel conduit fittings for use with flexible steel conduit of threadless hinged
23 clamp type. All flexible metal conduit fittings shall be Listed as suitable for grounding.
24
- 25 Straight Terminal Connectors: Provide insulated throat type, one piece body, female end with clamp and
26 deep slotted machine screw for securing conduit, and male threaded end provided with steel locknut.
27
- 28 45° or 90° Terminal Angle Connectors: Provide steel insulated throat type, two-piece body construction with
29 removable upper section, female end with clamp and deep slotted machine screw for securing conduit, and
30 male threaded end provided with steel locknut.
31
- 32 Liquid-Tight Flexible Metal Conduit Fittings: Type 1, Class 3, Style G. Provide cadmium plated, malleable iron
33 fittings with compression type steel ferrule and neoprene gasket sealing rings, with insulated throat and steel locknut.
34 All liquid tight flexible metal conduit fittings shall be Listed as suitable for grounding.
35
- 36 EMT Fittings:
37
38 EMT Conduit Couplings: Cadmium plated steel, dual compression type with two (2) hexagon compression
39 fittings. Fittings that can not be tightened with an open-end wrench of the appropriate size are not
40 acceptable.
41
42 EMT Conduit Connectors: Cadmium plated steel, insulated throat, compression type with hexagon
43 compression fitting and steel locknut. Fittings that can not be tightened with an open-end wrench of the
44 appropriate size are not acceptable.
45
46 Unacceptable fitting types: Pot metal, set screw, and indenter type fittings, or connectors that do not have
47 insulated throats, are not acceptable for use on this project.
48
- 49 Conduit Bodies: Provide galvanized steel conduit bodies of types, shapes and sizes as required to fulfill job and NEC
50 requirements. Conduit bodies shall be constructed with threaded conduit entrance ends, removable covers, either
51 cast or of galvanized steel, and corrosion-resistant screws.
52
- 53 Metallic Conduit, and Tubing Accessories: Provide metallic conduit and tubing accessories of types, sizes, and
54 materials, complying with manufacturer's published product information, which mate and match conduit and tubing.
55
56

1 Lay-in Wireway: Provide Lay-in wireway as required and/or indicated on the Drawings in accordance with UL 870,
2 with Listed and Labeled components. Wireway shall meet the requirements of NEC Article 376.
3

4 Construct lay-in wireways screw-on covers and/or covers as otherwise indicated on the Drawings, in
5 accordance with UL 870 and with Listed components, including lengths, connectors, and fittings. Select
6 units to allow fastening of cover closed without use of parts other than standard lengths, fittings and
7 connectors. Construct units to be capable of sealing cover in closed position with sealing ears. Provide
8 wireways with knockouts unless otherwise specified in the Drawings.
9

10 Construction: 16-gage galvanized sheet metal parts for 4" x 4" to 6" x 6" sections, and 14-gage parts for 8"
11 x 8" and larger sections. Provide wireway with no knockouts.
12

13 Connectors: Provide wireway connectors suitable for "lay-in" of conductors, with connector covers
14 permanently attached in a manner such that removal is not necessary to utilize the lay-in feature.
15

16 Finish: Provide 14-gage and 16-gage galvanized sheet metal parts with corrosion-resistant phosphate
17 primer and baked enamel finish. Plate hardware to prevent corrosion.
18

19 Provide NEMA 1 wireways for indoor use and NEMA 3R types for use in wet locations or in locations that
20 may be exposed to outdoor weather conditions
21

22 Do not use cover screws that will protrude into the trough area and damage wire insulation. Protect screws
23 installed toward inside of wireway with spring nuts to prevent wire insulation damage.
24

25 J.I.C. Wireway: Construct wireway in accordance with UL 870. Manufacture to J.I.C. standards for Oil-tight and
26 Dust-tight Lay-in Wireway, and to NMTBA standards for Industrial Control Equipment.
27

28 Lengths and Fittings: Manufacture from 14-gage steel, provide straight lengths with hinged covers with
29 appropriate gasket. Hold covers closed with external latches. Installation of knockouts in either lengths or
30 fittings are to be avoided.
31

32 Connections: Provide wireway that is suitable for "lay-in" conductors and with joint hardware assembly with
33 each piece. Provide gasketed joint assembly, attached in such a manner that it does not have to be
34 removed to utilize the lay-in feature.
35

36 Finish: Provide sheet metal parts with inhibiting phosphate coating and baked enamel finish.
37
38

39 **PART 3 - EXECUTION**

40 **INSPECTION**

41
42
43
44 Examine areas and conditions under which raceways are to be installed, and substrate that will support raceways.
45 Notify A-E in writing of conditions detrimental to proper completion of the Work. Do not proceed with work until
46 unsatisfactory conditions have been corrected.
47
48

49 **SELECTION OF RACEWAY AND SIZE OF RACEWAY SYSTEM**

50
51 General: Install concealed raceway system in new construction work, either in walls or above hung ceilings.
52

53 Do not route raceway below slabs unless such routing is specifically indicated on the Drawings.
54

55 Do not use surface metal raceway unless such use is specifically indicated on the Drawings.
56

57 Conduit Installation: Unless otherwise indicated on the Drawings, provide rigid steel zinc-coated conduit (RMC)
58 where embedded in concrete, masonry, earth, or installed outdoors. Follow minimum requirements in other areas as
59 follows:
60

1 Steel zinc-coated EMT may be installed in all areas except where specifically indicated otherwise in the
2 Drawings or under the conditions of use listed below:

- 3 • Where it will be installed in exterior walls.
- 4 • Where it will be installed outdoors, in concrete or in direct contact with the earth.
- 5 • Where it will be subject to physical damage.
- 6 • Where it will be installed lower than four (4) feet from finished floor in areas where exposed to
7 possible damage from area use activities.
- 8 • Where it will be subject to corrosive influence.
- 9 • Where it will be installed indoors in wet or damp locations.
- 10 • Where trade size is larger than 2".

11
12 **Any of the above use conditions may be overridden by the Drawings.**

13
14 Avoid use of dissimilar metals throughout system to reduce the possibility of galvanic action. Where dissimilar metals
15 must be in contact, coat surfaces with corrosion inhibiting compound before assembling.

16
17 Use liquid-tight flexible metal conduit (LFMC) only where specifically indicated on the Drawings or where subjected to
18 one or more of the following conditions:

- 19
- 20 • Flexible connection in an exterior location.
- 21 • Final 18" connection to motors.
- 22 • Equipment subject to movement or vibration.

23
24 Use Flexible Metal Conduit (FMC) only for final connections to light fixtures and utilization equipment. Any other use
25 shall be limited to applications where specifically indicated on the Drawings

26
27 Flexible Metal Conduit may not be used to interconnect device or junction boxes, utilization equipment,
28 fixtures.

29
30 Flexible Metal Conduit length shall not exceed six feet.

31
32 Size raceway and raceway systems as follows:

33
34 Size raceway to meet NEC requirements, or as indicated on the Drawings, whichever size is larger, except
35 no conduit smaller than 3/4 inch trade size shall be installed.

36 37 **INSTALLATION OF RACEWAY SYSTEMS**

38
39 General: Install raceways as indicated, in accordance with manufacturer's written installation instructions, and in
40 compliance with the NEC and NECA's "Standards of Installation." Install raceway and related boxes and fittings
41 plumb and level, $\pm 2^\circ$. Maintain manufacturer's recommended clearances.

42
43 Fasten heavy wall conduit terminations in sheet metal enclosures by two locknuts, one inside and one outside of
44 enclosure, and terminate with insulated bushing; terminate other conduit systems with connectors listed for the
45 purpose and as described above.

46
47 Conduit couplers shall be steel threaded type in all locations where such use is possible. Otherwise use 3-piece
48 union.

49
50 Conduits are not to cross pipe shafts or ventilating duct openings. Conduit is not to be routed in elevator shafts
51 unless necessary to serve items within the shaft.

52
53 Keep conduits a minimum distance of 6" from parallel runs of hot water pipes or other sources of heat. Wherever
54 possible, install horizontal raceway runs above water piping.

55
56 Support riser conduit at each floor level with clamp hangers.

57
58 Use of running threads at conduit joints and terminations is prohibited. Where required, use threaded nipples and
59 3-piece unions.

1 Support exposed conduit by use of hangers, clamps or clips Listed for the purpose. Support conduit on each side of
2 bends and on spacing not to exceed following:
3

- 4 • Rigid Metal Conduits Up to 1": 8'-0".
- 5 • Rigid Metal Conduits 1-1/4" and Over: 10'-0".
- 6 • EMT Up to 1": 8'-0".
- 7 • EMT 1-1/4" and Over: 10'-0".

8
9 Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using
10 galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers Listed for
11 the purpose. Requirements for exposed conduits also apply to conduits installed in space above hung ceilings.
12

13 Concealed Conduits:

- 14 • Metallic raceways installed underground, in floors below grade (where permitted), or outside are to
15 have conduit threads painted with corrosion inhibiting compound before couplings are assembled.
16 Draw up coupling and conduit sufficiently tight to ensure a water tight joint.
- 17 • For floors-on-grade (where permitted), install conduits under crushed rock and concrete slabs.
- 18 • Install underground conduits 24" below finished grade (24" cover) as a minimum or as otherwise
19 indicated on the Drawings if a greater depth is shown.

20
21
22 Exposed Conduits:

- 23 • Install conduits in a manner so as not to damage or run through structural members. Avoid
24 horizontal or cross runs in building partitions or side walls.
- 25 • Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at
26 right angles to walls of building.
- 27 • Install exposed conduit work as not to interfere with ceiling inserts, lights or ventilation ducts or
28 outlets. Coordinate conduit installation with other trades as required.
- 29 • Install exposed conduit directly on structure using two hole straps. Provide offsets at all boxes and
30 as required to avoid exiting utilities.
- 31 • Conduits installed on interior of exterior walls shall be spaced off the wall surface a minimum of ¼
32 inch with appropriate straps.

33
34
35 Run conduits for outlets on waterproof walls exposed where indicated on the Drawings. Set anchors for
36 supporting conduit on waterproof wall in waterproof cement. Requirements for exposed conduit also apply to
37 conduits installed in space above hung ceilings.
38

39 Raceway Fittings: Install connectors, couplers, and related fittings as required for a complete raceway system.

40
41 Install insulated bushings for terminating all types of raceway where termination is not made with an
42 insulated throat connector.

43
44 Where concentric, eccentric or over-sized knockouts are encountered, a grounding-type insulated bushing
45 shall be provided. Bushing shall be connected to the equipment grounding conductor.

46
47 Miscellaneous fittings such as reducers, chase nipples, 3-piece unions, and plugs are to be constructed from
48 steel and specifically designed and Listed for their particular application.
49

50 Coordinate with other work including wires/cables, boxes, and panel work, as necessary to interface installation of
51 electrical raceways and components with other work.
52

53 Mechanically fasten together metal conduits, enclosures, and other components comprising raceway system to form
54 a continuous electrical conductor. Connect to electrical boxes, fittings and cabinets to provide electrical continuity
55 and firm mechanical assembly.
56

57 Raceway must be installed as a complete system prior to the installation of cables, conductors, or pull wires
58 into any part of the systems.
59

- 1 Install miscellaneous fittings such as reducers, chase nipples, 3-piece unions, and plugs that have been
2 specifically designed and manufactured for their particular application. Install expansion fittings in raceways
3 every 200' linear run maximum and wherever structural expansion joints are crossed.
4
- 5 Use roughing-in dimensions of electrically supplied utilization equipment furnished by supplier or by other divisions as
6 appropriate. Set conduit and boxes for connection to units only after receiving review of dimensions and after
7 verification of location with other trades.
8
- 9 Do not set final connections for fixtures and/or utilization equipment until connection points and requirements
10 are accurately known. The Contractor is responsible for the relocation of mis-located connection points as
11 required to match equipment at no additional cost.
12
- 13 Cut conduits straight, properly ream. Threads shall be cut into heavy wall conduit using equipment designed for the
14 purpose.
15
- 16 Make changes in direction of raceway run by means of proper field bends or with proper fittings, supplied by raceway
17 manufacturer.
18
- 19 Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
20
- 21 Properly support and anchor raceways for their entire length by structural materials. Raceways are not to span any
22 space unsupported for lengths in excess of the maximum support distance as previously specified. Raceways may
23 not be used to support other raceways or other items of equipment.
24
- 25 Arrange conduit to maintain headroom and present a neat appearance.
26
- 27 Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
28
- 29 Group raceway in parallel runs where three (3) or more raceway are routed together. Use conduit rack constructed of
30 steel channel with conduit straps or clamps. Provide space for 25% additional conduit.
31
- 32 Do not fasten and/or hang conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire
33 used during construction for temporary conduit support.
34
- 35 Bring conduit to the shoulder of fittings and couplings and fasten securely. All raceway shall be cut to proper length
36 so ends fit accurately in connectors or couplers.
37
- 38 Use conduit hubs for fastening conduit to cast boxes and for fastening conduit to sheet metal boxes in damp or wet
39 locations.
40
- 41 Use conduit bodies to make sharp changes in direction, as around beams.
42
- 43 Use hydraulic one-shot conduit bender for all field bends in conduit. All field made conduit bends shall meet
44 minimum bending radius requirements of the NEC. Bends in metallic conduit shall be made while "cold". Factory
45 made conduit sections may be used in lieu of field made bends for conduit larger than 2".
46
- 47 Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
48
- 49 Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
50
- 51 Where raceways penetrate walls or partitions separating spaces with differing environmental conditions, such as
52 freezers, coolers and exterior walls, provide an internal seal to prevent condensation within the raceway as it enters
53 the conditioned space.
54
- 55 Where conduit penetrates fire rated partitions, provide penetration protection in accordance with the UL through-
56 penetration detail indicated on the Drawings for the type of partition and conduit involved. All instructions furnished
57 with firestopping materials shall be followed explicitly.
58

1 Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with
2 pitch pocket. All pitch pockets shall be absolutely water tight; once conduit has been routed through a pitch pocket
3 the water integrity of the pitch pocket is the responsibility of the Division 26-28 Contractor.

4
5 Combining of circuits into raceway systems other than indicated on Drawings shall not be permitted.

6
7 Bolts, clamps, screws and expansion bolts shall be used in securing conduit, equipment, etc. Holes for lead shields
8 or other anchors shall be the size recommended by the fastener manufacturer and shall be completely covered by
9 the mounted item. Holes used for support of conduit on brick or block walls shall be located in mortar joints where
10 such location is possible.

11
12 Provide nylon pull string in empty conduits where indicated, including conduit placed for telephone and data use.
13 Conduit installed but left empty (with pull string) shall be tested with a ball mandrel. Clear any conduit that rejects ball
14 mandrel. Any costs involved for restoration of conduit and surrounding surfaces to original condition are the
15 responsibility of the Contractor.

16
17
18 **END OF SECTION 260534**

1 **SECTION 260535 - ELECTRICAL BOXES AND FITTINGS**
2
3

4 **PART 1 - GENERAL**
5

6 **RELATED DOCUMENTS**
7

8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1
9 Specification sections, apply to work of this section.
10

11
12 **QUALITY ASSURANCE**
13

14 Manufacturers: Firms regularly engaged in manufacture of electrical boxes and fittings, of types, sizes, and
15 capacities required, whose products are Listed and Labeled.
16

17 Codes and Standards:

18 NEC Compliance: Comply with NEC as applicable to construction and installation of electrical wiring boxes
19 and fittings.
20

21 Testing Laboratory Compliance: Comply with applicable requirements of UL 50, UL 514-Series, and UL 886
22 pertaining to electrical boxes and fittings. Provide electrical boxes and fittings that are Listed and Labeled.
23
24

25
26 **SUBMITTALS**
27

28 Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal
29 requirements are defined in each section of this Division.
30

31 Product Data: Submit manufacturer's data on electrical boxes and fittings.
32
33

34 **PART 2 - PRODUCTS**
35
36

37 **FABRICATED MATERIALS**
38

39 Aluminum products are not acceptable for use on the project.
40

41 Outlet Boxes: Provide galvanized coated flat rolled sheet-steel outlet wiring boxes, of shapes, cubic inch capacities,
42 and sizes, including box depths as indicated, suitable for installation at respective locations. Construct outlet boxes
43 with mounting holes, and with cable or conduit-size knockout openings in bottom and sides. Provide boxes with
44 threaded screw holes for attachment of grounding conductor and cover plate or device attachment fittings.
45

46 Provide waterproof outlet boxes where box is installed in an outdoor location or in a wet location as defined
47 by the NEC.
48

49 Outlet Box Accessories: Provide outlet box accessories as required for each installation, including box supports,
50 mounting ears and brackets, wallboard hangers, box extension rings, fixture studs, cable clamps and metal straps for
51 supporting outlet boxes. Supplied items shall be compatible with outlet boxes being used to fulfill installation
52 requirements for individual wiring situations. Choice of accessories is Contractor's code-compliance option.
53

54 Device Boxes: Provide galvanized coated flat rolled sheet-steel device boxes, of shapes, cubic inch capacities, and
55 sizes, including box depths as indicated, suitable for installation at respective locations. Unless otherwise specified
56 device boxes shall be 4" square by 2 1/8" deep, flush mounted, and furnished with suitable plaster ring for the type
57 devices to be used and of a depth to match the type of construction involved. Device boxes shall have 3/4" knockout
58 openings in bottom and ends, and with threaded screw holes in the rear for attachment of a grounding conductor. All
59 fasteners shall have a corrosion resistant finish.
60

1 Where more than two devices are ganged together at a single location provide gangable device boxes with suitable
2 partitions, conduit knockouts and attachment hardware.

3
4 Device Box Accessories: Provide device box accessories as required for each installation, including mounting
5 brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners,
6 which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring
7 situations. Choice of accessories is Contractor's code-compliance option.

8
9 Where device boxes are surface mounted (as may permitted elsewhere) use cast steel type 'FS' boxes. Raintight
10 device boxes shall have threaded conduit holes for the attachment of electrical conduit, cast-metal face plates with
11 spring-hinged watertight caps suitable configured for each application, including face plate gaskets and
12 corrosion-resistant plugs and fasteners. Boxes provided under this section shall have a threaded internal grounding
13 conductor attachment point.

14
15 Device boxes exposed to outdoor or wet locations shall be flush mounted and shall be equipped with cast steel
16 covers that are designed to exclude water when closed.

17
18 Provide covers that are suitable for use in wet location with device attached if such use is indicated on the
19 Drawings.

20
21 Where flush mounting is not possible or not practicable due to the location of the device, provide surface
22 mounted cast steel type 'FS' boxes as described elsewhere.

23
24 Junction boxes with no more than 4 entries of ¾" conduit containing conductors no larger than #12 may be 4" square
25 by 2 1/8" deep with ¾" knockouts, threaded hole for connection of grounding conductor and threaded holes for the
26 attachment of a blank cover plate. Provide suitable blank cover plate. Box extensions shall not be used to obtain
27 more volume in 4" square junction boxes.

28
29 If box volume is not sufficient, the contractor may, as a code compliance option, may use 4 11/16" square by
30 2 1/8" deep boxes with ¾" knockouts, threaded hole for connection of grounding conductor and threaded
31 hoses for the attachment of a blank cover plate. Provide suitable blank cover plate. Box extensions shall
32 not be used to obtain more volume in 4 11/16" square junction boxes.

33
34 Use fabricated junction boxes as described below if box volumes that can be obtained by the use of 4"
35 square or 4 11/16" square boxes are not sufficient to meet NEC minimum volume requirements.

36
37 Junction and Pull Boxes: Provide as required galvanized code-gage sheet steel junction and pull boxes, no
38 knockouts, Listed, with screw-on covers. Types, shapes, and sizes of junction and pull boxes shall be suitable for
39 each respective location and installation. Boxes shall have welded seams and shall be equipped with stainless
40 fastening hardware. Provide steel barriers in boxes with multiple feeder circuits.

41
42 Auxiliary Wireways: Construct as required in accordance with UL 870, with Listed and Labeled components.

43
44 Construction: 16-gage galvanized sheet metal parts for 4" x 4" to 6" x 6" sections, and 14-gage parts for 8"
45 x 8" and larger sections. Provide wireways with no knockouts.

46
47 Finish: Provide 14-gage and 16-gage galvanized sheet metal parts. Plate hardware to prevent corrosion.

48
49 In outdoor or wet locations provide wireways that are NEMA 3R. Do not use gaskets that can rip or tear
50 during installation, or would otherwise compromise raintight capability of the wireway.

51
52 Do not use cover screws that will protrude into the trough area and damage wire insulation.

53
54 Size of device, outlet, junction, pull boxes, gutters, and similar components shall be as required to match the number
55 of devices and/or conductors contained within as based on the requirements of NEC Article 314.16.

56
57 Bushings, Knockout Closures and Locknuts: Provide corrosion-resistant box knockout closures, conduit locknuts and
58 malleable iron conduit insulated bushings, offset connectors, of types and sizes, to suit respective installation
59 requirements and applications.

PART 3 - EXECUTION

INSTALLATION OF ELECTRICAL BOXES AND FITTINGS

General: Install electrical boxes and fittings as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices to fulfill project requirements.

Coordinate installation of electrical boxes and fittings with wire/cable, wiring devices, and raceway installation work.

Provide weatherproof boxes and fittings for interior and exterior locations that are exposed to weather or moisture. Weatherproof boxes must be Listed and Labeled and identified as "extra duty" for use in wet locations.

Provide knockout closures to cap unused knockout holes where blanks have been removed.

Install electrical boxes and similar items only in those locations that ensure accessibility to enclosed electrical wiring.

Avoid installing boxes back-to-back in walls. Provide not less than 6" separation in non-rated partitions. Provide 24" minimum horizontal separation in fire-rated partitions or in acoustic rated walls.

Position recessed outlet or device boxes in walls or ceilings accurately to allow for surface finish thickness. Where the surface material or covering is combustible the front edge of the plaster ring (or box) shall be flush (- 0", +1/32") with the finished surface. Where the wall or ceiling material is non-combustible, the front edge of the plaster ring (or box) may be recessed into the wall no further than 3/16". The maximum gap between the edge of an installed box/plaster ring combination shall not exceed 1/8". **These requirements will be rigidly enforced.**

Fasten electrical boxes firmly and rigidly to substrates, or structural surfaces to which attached, or solidly embed electrical boxes in concrete or masonry. All boxes shall be supported independently of conduit.

Provide electrical connections for installed boxes.

Electrical box locations indicated on Drawings are approximate unless dimensioned. Verify location of outlets prior to rough-in. Coordinate exact locations with the work of other Divisions. Mis-located outlets and/or devices shall be relocated upon instruction from Owner's representative at no additional cost.

Locate and install to maintain headroom and to present a neat appearance.

Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems. Provide barriers to separate adjacent devices where the voltage is greater than 150 Volts between the devices.

Install boxes in walls without damaging wall insulation or fire proofing.

Position outlets to locate lighting fixtures and/or luminaries as indicated on Drawings. Boxes are to be positioned plum and vertical, $\pm 2^\circ$.

Align wall mounted outlet boxes for switches, thermostats, and similar devices.

Subsequent to installation of boxes, protect boxes from construction debris and damage.

GROUNDING

Upon completion of installation work, properly ground electrical boxes and demonstrate compliance with requirements.

END OF SECTION 260535

1 **PART 2 - PRODUCTS**
2
3

4 The Contractor shall employ testing devices as required to accomplish specified testing herein and as described
5 elsewhere in the Contract Documents.
6

7 Test Equipment Suitability: The test equipment used by the Contractor shall be suitable for the intended
8 tests and shall comply with ANSI/NETA ATS-2009, Section 5.2.
9

10 Test Equipment Calibration: The test equipment used by the Contractor shall be suitable for the intended
11 tests and shall comply with ANSI/NETA ATS-2009, Section 5.3.
12

13 **PART 3 - EXECUTION**
14
15

16 **GENERAL**
17

18
19 Check cable continuity and phase identification for each conductor used on the project. This includes service
20 conductors, feeders, and branch circuit conductors. It is not required to document this test in the testing report
21 required under this section.
22

23 Insulation testing: The insulation tests (resistance tests) as specified in this Section are the minimum readings
24 desired at an ambient temperature of 60° F and a low relative humidity.
25

26 Resistance readings taken at other than ambient temperature of 60° F shall be corrected to 60° F.
27

28 When resistance readings fall below the specified minimum values utilize recognized means to dry out the
29 equipment. The method utilized by the Contractor must be in accordance with manufacturer's written
30 instructions.
31

32 If drying is to be accomplished by applying an electric potential to a cable or piece of equipment, then, in no case
33 (induced or direct) shall the voltage or current exceed the ampacity or the continuous rating of the equipment being
34 dried.
35

36 **CABLE TESTS**
37

38
39 General: Disconnect each end of all cables from their associated equipment prior to the test.
40

41 Cables ≤ 600 Volt: Inspect all cable connections for workmanship and conformance with standard practice.
42
43

44 Perform the following tests:
45

46 Test cable insulation using a resistance tester.
47

48 Perform resistance tests between phases and between each conductor and ground with the other
49 conductors and interlocked armor (if part of cable assembly) grounded.
50

51 Test other conductors in the same manner. The minimum acceptable resistance reading for cables
52 shall be 1 megohm (MΩ) for #6 AWG conductors and smaller and 250,000 ohms (Ω) for #4 AWG
53 conductors and larger.
54

55 The Test Record Shall Include the Following:
56

57 Complete identification of the cable, including approximate length.
58

59 Resistance reading data.
60
61

1 **OVERCURRENT DEVICES**

2
3 Operational Test Procedures for Circuit Breakers: Visually inspect and manually operate breakers through a
4 minimum of three (3) open/close cycles. Check for correct alignment, freedom from binding and good contact.
5 Check phase matching and phase rotation immediately prior to energizing of equipment.
6

7
8 **DOCUMENTATION**

9
10 All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test
11 information.
12

13 All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the
14 prerequisites for, final acceptance of the project.
15

16
17 **TEST RESULTS**

18
19 The Contractor shall send a letter to the engineer, with a copy to the State Construction Office (SCO) official project
20 observer, certifying that the above testing has been performed. This shall be done at least four (4) days prior to final
21 inspection.
22

23 Final testing reports are to be available at the SCO final inspection.
24

25 At final inspection, the Contractor shall furnish instruments as required to demonstrate to the A-E and to the SCO
26 representative that all testing requirements have been satisfied. All measurement instruments, labor, and materials
27 associated with the testing, verification, and demonstration of results shall be provided without additional cost. The
28 contractor shall provide ladders, hand tools, digital multimeters, resistance tester, two-way radios and other specific
29 items required by the Engineer for the final inspection.
30

31
32 **END OF SECTION 260800**

PART 2 – PRODUCTS

OCCUPANCY SENSORS

Manufacturers: Provide equipment equivalent to that provided one of the following manufacturers:

- Wattstopper
- Novitas
- Sensor Switch
- Hubbell

Sensors shall be provided with a single pole, isolated relay (30V AC/DC, 1A) for interface with building automation system. Relay and contact ratings shall be clearly indicated in submittal literature.

Occupancy sensors are diagrammatically indicated on the lighting plans, based on coverage areas of approximately 1,000 square feet/sensor for ceiling heights up to 10 feet. Contractor shall verify the locations and quantities of sensors installed to properly cover each space based on actual coverage patterns of submitted/approved products. Sensors shall be installed in coordination with the manufacturer's instructions, including separation from air distribution patterns associated with HVAC diffusers.

Wall Switch Occupancy Sensor: Provide a wall mounted, dual technology occupancy sensor with a manual on/off switch. Switch shall support manual-on and automatic-on (previous setting) operation. Switch to be rated at 800W @ 120V and 1,200W @ 277V. Provide vandal resistant, hard usage lens for sensor.

Wall Switch Occupancy Sensor/Dimmer: Provide a wall mounted, dual technology occupancy sensor with 0-10V dimming. Switch shall support manual-on and automatic-on (previous setting) operation. Multiple switches may be used together, each providing full dimming operation, in up to four locations for a switch group. Switch to be rated at 1,000W @ 120V and 1,200W @ 277V. Provide vandal resistant, hard usage lens for sensor.

Dual Technology Ceiling Mounted Occupancy Sensor: Provide a 24 VAC ceiling mounted combination passive infrared and ultrasonic sensor. Coverage for normal desktop motion shall be 900 square feet at a 360° pattern. Provide sensor with an integral daylighting control interface. Provide compatible power modules as required to interconnect sensors to controlled loads.

Sensors shall be provided with the following options and set in accordance with values listed.

Sensor Parameter	Option	Setting
Activation	Manual / Automatic	Automatic
Time Delay		15 minutes
Walk Through	On / Off	Off
PIR Sensitivity	10-100% (10% increments) / Off	90%
Ultrasonic Sensitivity	10-100% (10% increments) / Off	70%
Test Mode	In / Off	Off
Detection Technology	Ultrasonic / PIR / Both / Either	Both
Retrigger Technology	Ultrasonic / PIR / Both / Either	Either

CONTACTORS

General: Except as otherwise indicated, provide contactors and ancillary components that comply with manufacturer's standard materials, design and construction in accordance with published product information, and as required for complete installation.

Lighting Contactors: Provide full voltage alternating current lighting contactor, of types, sizes, ratings, and NEMA sizes indicated. Equip contactors with mechanically held contacts. Construct and mount starters in NEMA Type 1 enclosure; coat with manufacturer's standard color finish.

1 **VERRIDE SWITCHES**

2
3 General: Provide override switches as indicated on the Drawings. Switches shall be located to provide for the
4 override specific lighting during unoccupied hours. Switch type and arrangements shall be compatible with the
5 automatic control device (time clock, contactor) used for lighting. Lights shall be energized in response to override
6 switches for 2 hours.
7

8
9 **PUSHBUTTONS**

10
11 General: Except as otherwise indicated, provide pushbuttons and ancillary components that comply with
12 manufacturer's standard materials, design and construction in accordance with published product information, and as
13 required for complete installation.
14

15 Selector Switches: Provide selector switches (H-O-A) with red pilot light as indicated, flush mounted, heavy duty, oil-
16 tight, maintained contact, indicating lights. Selector switches shall be mounted in flush wall mounted enclosures.
17

18 Provide galvanized sheet steel cabinet type enclosures, flush wall mounted, in sizes and NEMA 1 as indicated, code
19 gauge, minimum 16 gauge thickness. Construct without knockouts. Provide fronts with adjustable trim clamps, and
20 with concealed piano door hinges and door swings as indicated. Provide metal pushbutton mounting within
21 enclosure, 14 gauge thickness. Equip with interior directory frame, and card with clear plastic covering. Provide
22 baked gray enamel finish over a rust inhibitor coating. Provide enclosures that are fabricated by same manufacturer
23 as panelboards.
24

25
26 **PHOTOCONTROL SWITCHES**

27
28 Photocontrol Switches: Provide electrically operated photocontrol switches, rated 1,800 Watts, 120 Volts, 60 Hz,
29 weatherproof enclosure, external pipe threaded nipple, fail safe, load to remain ON in case of cell failure.
30

31
32 **PART 3 – EXECUTION**

33
34
35 **INSTALLATION**

36
37 Install equipment level and plumb and according to manufacturer's written instructions.
38

39 Mount lighting control devices according to manufacturer's written instructions and requirements in Section 260500,
40 *BASIC ELECTRICAL REQUIREMENTS*.
41

42 Mounting heights indicated are to bottom of unit for suspended devices and to center of unit for wall-mounting
43 devices.
44

45 Spare Parts: Provide the following spare parts with the system, each individually packaged and labeled. For multi-
46 building projects, calculate separately for each building:

47
48 Wall mounted occupancy sensors (each type) 4% of installed quantity
49 Ceiling mounted occupancy sensors (each type) 4% of installed quantity
50

51 Increase decimal quantities of spare parts to the next higher whole number. For example if a system has 20
52 wall mounted passive infrared sensors, provide 2 spare sensors.
53

54
55 **CONTROL WIRING INSTALLATION**

56
57 General: Install wiring between sensing and control devices according to manufacturer's written instructions and as
58 specified in Section 260519, *SECONDARY VOLTAGE WIRES AND CABLES*, for low-voltage connections and for
59 digital circuits.
60

1 Wiring Method: Install all wiring in raceway as specified in Section 260534, *RACEWAYS* and Section 260535,
2 *ELECTRICAL BOXES AND FITTINGS*.

3
4 Connections: Tighten electrical connectors and terminals according to manufacturer's published torque-tightening
5 values. If manufacturer's torque values are not indicated, use those specified in UL 486A.
6

7
8 **IDENTIFICATION**

9
10 Identify components and power and control wiring according to Section 260533, *ELECTRICAL IDENTIFICATION*.
11

12
13 **FIELD QUALITY CONTROL**

14
15 Inspect control components for defects and physical damage, testing laboratory labeling, and nameplate compliance
16 with the Contract Documents.
17

18 Verify settings of photoelectric devices with photometer calibrated within previous six months.
19

20 Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform continuity
21 tests of circuits prior to installing devices. Perform operational tests according to manufacturer's written instructions.
22 Set and operate devices to demonstrate their functions and capabilities in a methodical sequence that cues and
23 reproduces actual operating functions. Test devices under conditions that simulate actual operational conditions.
24 Record control settings, operations, cues, and functional observations.
25

26 Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.
27

28
29 **CLEANING**

30
31 Cleaning: Clean equipment and devices internally and externally using methods and materials recommended by
32 manufacturers, and repair damaged finishes.
33

34
35 **OPERATIONS AND MAINTENANCE MANUAL**

36
37 Manuals shall include product data for all installed products that identifies all selected options for each component of
38 lighting controls system.
39

40 Identify manufacturer's requirements and recommendations for routine maintenance actions, recalibration and
41 cleaning. Identify schedule for items above.
42

43 Provide a narrative of the system operation, specific to the installation, including the actual set points.
44

45
46 **WARRANTY PERIOD**

47
48 Warranty period for occupancy sensors shall be one year, beginning upon acceptance of the installation by the
49 Owner. Include up to three site visits within the first year, upon request by the Owner, to adjust light levels, make
50 program changes, and adjust sensors and controls to suit actual conditions.
51

52
53 **END OF SECTION 260923**

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

Manufacturers: Firms regularly engaged in manufacture of wiring devices, of types and ratings required in this Section, whose products are Listed and Labeled for the purpose intended. Subject to compliance with requirements provide devices equivalent to that provided by one of the following manufacturers:

Hubbell
Cooper Devices
Leviton
Pass & Seymour

Codes and Standards:

NEC Compliance: Comply with NEC as applicable to installation and wiring of electrical wiring devices.

Testing Laboratory Compliance: Comply with applicable requirements of UL 20, 486A, 498, and 943 pertaining to installation of wiring devices. Provide wiring devices that are Listed and Labeled.

NEMA Compliance: Comply with applicable portions of NEMA Standards No. WD 1, "General Purpose Wiring Devices", WD 2, "Semiconductor Dimmers for Incandescent Lamps", and WD 5, "Specific Purpose Wiring Devices".

SUBMITTALS

Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal requirements are defined in each section of this Division.

Product Data: Submit manufacturer's data on electrical wiring devices.

PART 2 - PRODUCTS

FABRICATED WIRING DEVICES

General: Provide factory fabricated wiring devices in types, colors, and electrical ratings for applications indicated and which comply with NEMA WD 1.

"Specification" grade devices, as used in this section shall be "Federal Specification" grade devices.

Color: Provide wiring device colors to match existing building devices unless indicated otherwise for selected locations elsewhere in the Specifications or on the Drawings.

Receptacles:

General-Use Duplex: Provide duplex specification grade, tamper resistant type receptacle, 2-pole, 3-wire, grounding, with green hexagonal equipment ground screw, high impact nylon face, ground terminal, brass triple wipe contacts, 20 Ampere rated, 125-volts, with metal plaster ears. Provide receptacles with grounding terminal internally connected to mounting yoke. Receptacles shall be designed for side and back wiring with spring-loaded, screw activated pressure plates, with NEMA configuration 5-20R unless otherwise indicated.

1 General-Use Simplex: Provide single specification grade, tamper resistant type receptacle, 2-pole, 3-wire,
2 grounding, with green hexagonal equipment ground screw, high impact nylon face, ground terminal, brass
3 triple wipe contacts, 20 Ampere rated, 125 volts, with metal plaster ears. Provide receptacles with
4 grounding terminal internally connected to mounting yoke. Receptacles shall be designed for side and back
5 wiring with spring-loaded, screw activated pressure plates, with NEMA configuration 5-20R unless otherwise
6 indicated.

7
8 Ground-Fault Interrupter: Provide specification grade, tamper resistant type ground-fault circuit interrupter,
9 with heavy-duty duplex receptacles capable of being installed in a 1-1/2" deep outlet box without adapter.
10 Ground fault interrupter receptacles shall be grounding type, UL Class A, Group 1, 20 ampere rated,
11 120-volts, 60 Hz, with high impact nylon face, brass triple wipe contacts, and solid-state ground-fault sensing
12 and signaling. Devices shall have 5 milliamperes ground-fault trip level and shall be equipped with NEMA
13 configuration 5-20R.

14
15 Special Receptacles: Provide special receptacles with NEMA configuration, voltage rating, current rating,
16 and other attributes as indicated on the Drawings in Receptacle Schedules, General Notes, Keyed Notes, or
17 other designations.

18
19 Receptacles provided are to be either straight blade, locking type, or pin type as indicated. All
20 receptacles are to be equipped with green hexagonal equipment ground screw, brass triple wipe
21 contacts and brass connector screws.

22
23 Receptacles shall be designed for both side and back wiring with spring-loaded and screw
24 activated pressure plates where such are available in the device type indicated.

25
26 All 15- and 20-ampere, 125- and 250-volt, non-locking (straight blade) receptacles specified in
27 areas identified in NEC 406.12 shall be tamper resistant type.

28
29 Cord Reel Assembly: Provide cord reel assembly at locations indicated on the Drawings. Assembly
30 housing shall be all steel construction with mounting base and powder coat finish, rated for indoor use.
31 Assembly shall include 35 foot retractable cord, terminated with pre-wired outlet box containing two duplex
32 (5-20R) receptacles. Conductors shall be 12 AWG, black Type SJOW. Cord shall have adjustable ball stop
33 and cord assembly shall be capable of both positive lock and constant tension operation.

34
35 Miscellaneous Features:

36
37 Provide the following additional receptacle features where such is required by code or indicated on the
38 drawings:

39
40 Weather resistant (WR) for all general use and ground fault interrupter receptacles installed in
41 damp and wet locations.

42
43 Switches:

44
45 Snap: Provide heavy-duty, specification grade, flush single-pole AC quiet toggle switches, 20 Amperes,
46 120-277 Volts AC, with silver cadmium oxide contacts, brass terminal screws, and mounting yoke insulated
47 from mechanism. Equip switches with plaster ears, switch handle, and green hexagonal equipment
48 grounding screw. Switches shall be designed for side and back wiring with spring-loaded, screw activated
49 pressure plates.

50
51 Three Way: Provide heavy-duty, specification grade, flush 3-way AC quiet switches, 20 Amperes, 120-277
52 Volts, with silver cadmium oxide contacts, brass terminal screws, and mounting yoke insulated from
53 mechanism. Equip switches with plaster ears, switch handle, green hexagonal equipment grounding screw.
54 Switches shall be designed for side and back wiring with spring-loaded, screw activated pressure plates.

55
56 Four Way: Provide heavy-duty, specification grade, flush 4-way AC quiet switches, 20 Amperes, 120-277
57 Volts, with silver cadmium oxide contacts, brass terminal screws, and mounting yoke insulated from
58 mechanism. Equip switches with plaster ears, switch handle, green hexagonal equipment grounding screw.
59 Switches shall be designed for side and back wiring with spring-loaded, screw activated pressure plates.

60

1 Miscellaneous Features:

2
3 Provide the following additional switch features where such is indicated on the drawings:

4
5 Key operation; supply one key per switch.

6
7 0-10 Volt Dimmers: Provide specification grade, preset type slide control, single pole branch lighting solid state 0-10
8 Volt DC dimmer control for LED source fixtures. Dimmers shall be designed for side and back wiring with spring-
9 loaded, screw activated pressure plates where such are available. Wattage shall be a minimum of 125% of the
10 connected load unless otherwise specified on the Drawings. Dimmer shall be compatible with fixture driver/ballast in
11 coordination with light fixture package provided.

12
13
14 **WIRING DEVICE ACCESSORIES**

15
16 Wallplates for Flush Mounted Devices: Provide standard sized stainless steel (Type 302) wallplates for flush
17 mounted single and combination wiring devices of types, sizes, and with ganging and cutouts as required for the
18 application. Select plates that mate and match wiring devices to which attached; provide blank plates for empty or
19 unused boxes. Provide screws for securing plates to devices; screw heads shall match finish of plates. Oversized
20 plate shall not be used unless specifically permitted by the A-E. A quantity of 2% spare plates shall be provided for
21 the Owner.

22
23 Wallplates for Surface Mounted Devices: Provide steel plates as required to match device box construction.

24
25 Wallplates for exterior and/or wet locations: Provide weatherproof PVC products listed as "extra duty while in use."
26 Covers shall be rectangular, transparent high-impact, UV-resistant polycarbonate.

27
28
29 **PART 3 - EXECUTION**

30
31
32 **INSTALLATION OF WIRING DEVICES**

33
34 Install wiring devices as indicated in accordance with manufacturer's written instructions, applicable requirements of
35 NEC and NECA's "Standard of Installation," and in accordance with recognized industry practices to fulfill project
36 requirements.

37
38 Coordinate with other work, including painting, electrical boxes and wiring work, as necessary to interface installation
39 of wiring devices with other work.

40
41 Install wiring devices only in electrical boxes that are clean, free from excess building materials, dirt, and debris.

42
43 Install wiring devices after wiring work is completed.

44
45 Install wallplates after painting work is completed.

46
47 Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's
48 published torque tightening values for wiring devices. Where manufacturer's torquing requirements are not indicated,
49 tighten connectors and terminals to comply with tightening torque's specified in UL Stds 486A and B. Use properly
50 scaled torque indicating hand tool.

51
52
53 **PROTECTION OF WALLPLATES AND RECEPTACLES**

54
55 Upon installation of wallplates and receptacles, advise other project Contractors regarding proper and cautious use of
56 convenience outlets. At time of Substantial Completion, replace those items that have been damaged, including
57 those burned and scored by faulty plugs.

1 **GROUNDING**

2
3 Provide equipment grounding connections for all wiring devices, unless otherwise indicated. All devices, including
4 switches, shall be grounded by an individual insulated green equipment grounding conductor connected to the
5 grounding conductor that is run with the ungrounded conductors, and attached to the device box. Comply with
6 tightening torque's specified in UL Std. 486A to assure permanent and effective grounds.
7

8
9 **TESTING**

10
11 Prior to energizing circuitry, test wiring for electrical continuity, and for short-circuits. Ensure proper polarity of
12 connections is maintained. Subsequent to energizing, test wiring devices to demonstrate compliance with
13 requirements.
14

15
16 **FIELD QUALITY CONTROL**

17
18 Subsequent to completion of installation of electrical disconnect switches, energize circuitry and demonstrate
19 capability and compliance with requirements. Correct any faults to assure compliance with requirements. Retest to
20 demonstrate compliance. Devices that fail to comply with requirements shall be removed and replaced with new
21 units. Retest all replaced devices.
22

23
24 **END OF SECTION 262726**

1 **SECTION 262816 – ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

2

3 **PART 1 - GENERAL**

4

5

6 **RELATED DOCUMENTS**

7

8 Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1

9 Specification sections, apply to work of this section.

10

11

12 **SUMMARY**

13

14 This section includes fusible switches, non-fusible switches, molded case circuit breakers and enclosures.

15

16

17 **QUALITY ASSURANCE**

18

19 **Manufacturers:** Firms regularly engaged in manufacture of electrical switches and circuit breakers, of types and

20 ratings required in this Section, whose products are Listed and Labeled for the purpose intended. Subject to

21 compliance with requirements provide equipment equivalent to that provided by one of the following manufacturers:

- 22
- 23 Square D
 - 24 Cutler Hammer
 - 25 General Electric
 - 26 Siemens

27

28 **Codes and Standards:**

29

30 **NEC Compliance:** Comply with NEC requirements pertaining to construction and installation of electrical

31 switches and circuit breakers.

32

33 **Testing Laboratory Compliance:** Comply with applicable requirements of UL 489, "Molded-Case Circuit

34 Breakers, Molded Case Switches, and Circuit-Breaker enclosures pertaining to circuit breakers, accessories

35 and enclosures. Provide units that are Listed and Labeled.

36

37 **Special-Use Markings:** Provide enclosed circuit breakers, constructed for special-use, with appropriate

38 Listed marks that indicates that they are suitable for special type of use/application including service

39 entrance equipment.

40

41 **Testing Laboratory Compliance:** Comply with requirements of UL 98, "*Enclosed and Dead-Front Switches*".

42 Provide safety switches that have been Listed and Labeled.

43

44 **NEMA Compliance:** Comply with applicable requirements of NEMA Standard Publication No. KS 1,

45 "*Enclosed Switches*" and 250, "*Enclosures for Electrical Equipment (1000 Volts Maximum)*".

46

47

48 **SUBMITTALS**

49

50 Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal

51 requirements are defined in each section of this Division.

52

53 **Product Data:** Submit manufacturer's data on electrical switches and circuit breakers.

PART 2 - PRODUCTS

MOLDED CASE CIRCUIT BREAKERS

Thermal Magnetic Circuit Breakers: Provide factory assembled, molded case circuit breakers of frame sizes, characteristics, and ratings including RMS symmetrical interrupting ratings indicated. Select breakers with permanent thermal and instantaneous magnetic trip, and with fault current limiting protection, ampere ratings as indicated. Construct with overcenter, trip free, toggle type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Construct breakers for mounting and operating in any physical position in an ambient temperature of 40°C. Provide breakers with mechanical screw type removable connector lugs, AL/CU rated.

Circuit Breaker Lugs: Provide circuit breaker lugs to match feeder conductors as indicated on the Drawings. In general, the ampere rating of circuit breakers is selected to support the requirements of the load. In cases where circuit conductor size has been increased for improved voltage drop, or other reasons, provide increased lug size as needed to match increased conductor size. Provide larger circuit breaker frame size if same is required to accommodate increased conductor size as described above.

Provide NEMA Type 1 enclosure unless otherwise indicated on the Drawings; provide NEMA Type 3R enclosure where the Drawings indicate weatherproof. Other enclosure types shall be furnished if specifically indicated on the Drawings.

FABRICATED SWITCHES

Safety Switches: Provide surface-mounted, heavy duty, steel enclosed safety switches, of types, voltage rating, current rating, and number of poles indicated on the Drawings.

Switches with no drawing indication of number of poles are three pole types. Switches shall be fusible type, rated as follows unless otherwise specified:

For 480Y/277 V.: Use 600 Volt type, with neutral and grounding bus.

For 208Y/120 V.: Use 250 Volt type, with neutral and grounding bus.

Provide internally mounted, insulated, neutral bus suitable for copper conductors. Provide separate equipment grounding bus, bonded to the enclosure and marked for use as a grounding bus.

Provide horsepower rated switches incorporating quick-make, quick-break type switches constructed so that switch blades are visible in OFF position with door open. Equip with operating handle which is integral part of enclosure base and whose operating position is easily recognizable. Internal current carrying components shall be high-conductivity copper; switch contacts shall be silver-tungsten type. Fuse holders shall have positive pressure type reinforced fuse clips. Where non-fused disconnect switches are indicated, provide solid copper bus bars in lieu of fuses.

Provide NEMA Type 1 enclosure unless otherwise indicated on the Drawings; provide NEMA Type 3R enclosure where the Drawings indicate weatherproof. Other enclosure types shall be furnished if specifically indicated on the Drawings.

Provide switches that may be locked in either the "ON" or "OFF" condition with a 1/4" shackle hasp-type lock. Safety switches shall have door interlocks that prevent the door from opening when the operating handle of the switch is in the "on" position. Manual defeat mechanisms shall be provided for the interlocks.

Provide two-pole interlock switches for all disconnects that are used with utilization equipment requiring control connections provided under other divisions. The interlock switch is to be configured such that when the disconnect is open the interlock switch is open.

Provide additional interlock switches, auxiliary contacts, mechanical key interlocks, or other accessories as may be described by the Drawings.

1 Fuses: Provide fuses for safety switches of classes, types, and ratings needed to fulfill electrical requirements of
2 Divisions 26-28 supplied utilization equipment served by the safety switch. Dual element fuses shall be cartridge type
3 with ferrule contact or knife-blade contact type as appropriate.

4
5 Fuses for equipment supplied by other divisions are to be furnished and installed by the division supplying
6 the equipment.

7
8 Fuses are not to be installed by this contractor unless the equipment served by the disconnect is furnished under
9 Divisions 26-28.

10
11
12 **PART 3 - EXECUTION**

13
14
15 **INSTALLATION OF ENCLOSED SWITCHES AND CIRCUIT BREAKERS**

16
17 Install electrical switches and circuit breakers as indicated, complying with manufacturer's written instructions,
18 applicable requirements of NEC, NEMA, and NECA's "Standard of Installation," and in accordance with recognized
19 industry practices.

20
21 Coordinate electrical switches and circuit breakers installation work with electrical raceway and cable work, as
22 necessary for proper interface. Coordinate exact location of switches with equipment electrical connection point.

23
24 Locate electrical switches and circuit breakers so that they are accessible after all project elements are
25 installed. Location selected for switches must permit complete opening of the disconnect door or cover to
26 the maximum amount permitted by the design of the switch enclosure.

27
28 Install electrical switches and circuit breakers for use with motor-driven appliances, and motors and controllers within
29 sight of controller position unless otherwise indicated.

30
31
32 **GROUNDING**

33
34 Provide equipment grounding connections, sufficiently tight to assure a permanent and effective ground, for electrical
35 switches and circuit breakers. All electrical switches and circuit breakers shall be grounded by means of a separate
36 insulated grounding conductor, run with the ungrounded conductors, and bonded to the disconnect enclosure by
37 means of a dedicated grounding screw terminal or bus.

38
39
40 **FIELD QUALITY CONTROL**

41
42 Subsequent to completion of installation of electrical switches and circuit breakers, energize circuitry and
43 demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at project
44 site, then retest to demonstrate compliance; otherwise remove and replace with new units and retest.

45
46
47 **END OF SECTION 262816**

SECTION 26 51 00

INTERIOR LIGHTING FIXTURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Interior fixtures including light engines, drivers, accessories and other related components.

1.2 RELATED SECTION

- A. The Work under this section is subject to requirements of the Contract Documents including the General Conditions, Supplementary Conditions, and sections under Division 01 General Requirements and other Sections in Division 26 and 27

1.3 STANDARDS

- A. The standards and regulating committees referred to in this specification and to which compliance with is required are:

UL	Underwriters Laboratories
NRTL	Nationally Recognized Testing Laboratory
NEC	National Electric Code
ANSI	American National Standards Institute
ASTM	American Society of Testing and Materials
NEMA	National Electrical Manufacturers Association
IEC	International Electrotechnical Commission

- B. All fixtures and assembled components shall be new, of good quality, and be approved by and bear the label of UL for the applicable location and conditions (wet, damp, dry, etc.) or other Nationally Recognized Testing Laboratories, i.e. CSA, ETL, unless otherwise specified in writing.
- C. All fixtures shall meet all required local, state and/or national building, electrical and energy codes and regulations.

1.4 SUBMITTALS

- A. General: submit each item in this article according to the conditions of the contract and Division 1 specification sections
- B. Multiple name specifications: where three or more manufacturers are named for a fixture type, provide the specified product from one of the named manufacturers. No substitutions will be considered unless expressly required by applicable local regulation.
- C. Single Name Specifications: Where a single manufacturer and model is named for a Fixture Type, that manufacturer and model shall be considered the Basis of Design and any proposed

equivalent products will be evaluated against these fixtures by the Lighting Consultant, Architect and Electrical Engineer.

- D. Proposed equivalent products shall only be considered if they meet the following conditions
1. Luminaire shall be listed by a Nationally Recognized Testing Laboratory
 2. Luminaire shall be identical in material, workmanship, photometric performance, physical appearance and warranty to the Basis of Design
 3. Luminaire manufacturer shall have been in business and have been manufacturing similar products for at least five years with no history of legal action related to safety or warranty of their products
 4. Vendor shall provide unit pricing for luminaire based on the quantities shown on the Contract Drawings and shall be good for the life of the project.
 5. All proposed equivalents shall included all accessories, options and components as indicated in written and drawn descriptions and catalog logic related to Basis of Design Fixture
 6. Contractor shall assume all liability for modification of documents and coordination with other trades due to proposed equivalent products.
- E. Product Data: Fixtures, lamps, ballasts and poles or other mounting components. Arrange Product Data for fixtures in order of fixture designation. Include data on features and accessories and the following:
- F. Outline drawings indicating dimensions and principal features of fixtures.
- G. Electrical Ratings and Photometric Data: Certified results of independent laboratory tests for fixtures and lamp
1. Provide data as required to demonstrate that the submitted product meets or exceeds the performance of the specified fixture.
 2. Include photometric data charts: C.U., candlepower distribution and/or luminance information as necessary.
 3. Where technical charts alone cannot substantiate compliance, the submitting manufacturer may be required to provide a full photometric study of a specific project application for verification.
- H. Lamp/Light Engine Data: Manufacturer, ordering code and technical information
- I. Ballast/Driver/Transformer Data: Manufacturer, ordering code and technical data showing compliance with requirements.
- J. Where fixture manufacturer will utilize ballasts/drivers/transformers from multiple manufacturers depending on availability, technical data must indicate the minimum characteristics that will be met in all cases
- K. Scaled shop drawings detailing nonstandard fixtures and indicating dimensions, weights, method of field assembly, components, features, and accessories. Details shall be scaled at not less than half full size
- L. Scaled shop drawings of continuous run fixtures shall indicate overall length of each run, lamp / light engine combinations used to achieve the length and any accessory components required.

- M. Wiring diagrams detailing wiring for control system showing both factory-installed and field-installed wiring for specific system of this Project, and differentiating between factory-installed and field-installed wiring.
- N. Professional certificates signed by manufacturers of lighting fixtures certifying that their products comply with specified requirements.
- O. Field test reports indicating and interpreting test results specified in Part 3 of this section
- P. Maintenance data for fixture to include in the operation and maintenance manual specified in Division 1

1.5 QUALITY ASSURANCE

- A. Fixture materials: provide fixture parts and components that are constructed of materials most appropriate to their use or function, and that are resistant to corrosion in a marine environment and mechanical stresses encountered in the normal application and function of the fixtures.
- B. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by a NTRL
- C. Listing and Labeling: Provide fixtures and accessory components specified in this Section that are listed and labeled for their indicated use and installation conditions on Project.
- D. Special Listing and Labeling: Provide fixtures for use in damp or wet locations, underwater, and recessed in combustible construction that are specifically listed and labeled for such use. Provide fixtures for use in hazardous (classified) locations that are listed and labeled for the specific hazard
- E. Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- F. Applicable Codes: Fixtures shall be made and installed in accordance with the current version of the National Electric Code, the Uniform Building Code, the Federal Occupational Safety & Health Act, local codes (including 780 CMR), and other applicable regulations.
- G. Measuring and Testing Equipment: Instruments for the measurement of voltage, luminaire temperature, lighting level and fixture brightness level shall be available at all times on the site.

1.6 WARRANTY:

- A. General warranty: the special warranty specified in this article shall not deprive the owner of other rights the owner may have under other provisions of the contract documents and shall be in addition to, and run concurrent with, other warranties made by the contractor under requirements of the contract documents.
- B. Special Warranty: Submit a written warranty signed by manufacturer and Installer agreeing to replace external parts of lighting fixtures exhibiting a failure of finish as specified below. This warranty is in addition to, and not a limitation of, other rights and remedies the Owner may have under the Contract Documents.
- C. Special Warranty Period: 5 years from date of final acceptance of the project by State Construction Office and the owner.

1.7 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: Luminaires and lighting equipment shall be delivered to the project complete, including mounting devices, lamps and components necessary for the proper operation of the equipment.
- B. Marking: All equipment must be clearly and boldly identified as to the fixture type and, where practicable, the fixture location
- C. Voltage Identification: Fixtures designed for voltages other than 110-125 volt circuits shall be clearly marked.
- D. Timely Purchase: Luminaires, associated lamps and other allied equipment shall be ordered in a timely fashion and securely stored to be available to meet the project schedule

1.8 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
- B. Lamps: 10 lamps for every 100 of each type and rating installed. Furnish at least one of each type.
- C. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
- D. Ballasts/Drivers/Transformers: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
- E. Globes and Guards: 1 for every 20 of each type and rating installed. Furnish at least one of each type.
- F. Parabolic Louvers and Reflector Cones: 1 for every 100 of each type. Furnish at least one of each type.
- G. Custom Luminaires: When 10 identical custom fixtures are furnished, furnish one complete spare custom fixture as attic stock.
- H. Light emitting diodes: Supply 1 light engine (smallest field replaceable light source) for every 10 of each type and rating installed.
- I. Deliver replacement stock as directed to Owner's storage space

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Products: Subject to compliance with requirements, fixtures that may be incorporated into the Work include, but are not limited to, the products specified in the Lighting Fixture Schedule at the end of this Section or on lighting drawings. The photometric performance of all submitted products must meet or exceed the performance of the specified fixtures where proposed as determined by the Lighting Consultant.

2.2 FIXTURES AND FIXTURE COMPONENTS GENERAL

- A. Sheet Metal Components: Provide the required dimensional thickness of metal, plastic and composite materials so that all fixtures are rigid, stable and will resist deflection, twisting, warping under normal installation, and relamping procedures.
- B. All luminaire housings shall be minimum 0.84mm cold rolled steel, unless a heavier gauge is specified or required by code.
- C. All aluminum extrusion housings shall be minimum 5mm thick.
- D. All spun, hydro-formed or sheet aluminum reflectors shall be fabricated from #12 aluminum sheets minimum, 1.45mm or heavier. Material shall be 3002 alloy, 99.5% pure aluminum with uniform grain structure.
- E. All spun aluminum housings shall be of an alloy of the 5000 series or of an alloy that is found to have equal corrosion resistance.
- F. Joints: Provide positive, durable, means of connection at all joints as required. No hollow rivets, unless specifically approved
- G. Gaskets: Provide neoprene, silicone, rubber, or other appropriate gaskets, stops, and barriers where required to prevent light leak, control sound and vibration, prevent water leaks and, if pertinent, water vapor penetration.
- H. Edges: Provide finished product with the following minimum qualities
 - I. Ground and/or burr free metal edges
 - J. Tight fitting connections, hinges and closures
 - K. Clean neat corners, edges trims and frames
- L. Linear products:
 - 1. Unless otherwise noted, where linear light fixtures are shown abutting, provide continuous housings and lenses as required to create visually continuous lighting fixture with no gaps, shadows, light-leaks or hot-spots.
 - 2. Unless otherwise noted, where linear light fixtures meet at a corner or wall-to-ceiling condition, supply factory fabricated illuminated corners with required angle to created continuous lighting with no gaps, shadows, light-leaks or hot-spots.
 - 3. All linear lensed light fixtures shall be from the same manufacturer and provide consistent color across all fixtures.
- M. Castings: all cast parts, including die-cast members, shall be of uniform quality; free from blow holes, pores, hard spots, shrinkage defects, cracks and or other imperfections that affect strength and appearance, or are indicative of inferior metals or alloys.
- N. Reflecting surfaces: minimum reflectance as follows, except as otherwise indicated:
 - 1. White surfaces: 85 percent
 - 2. Specular surfaces 83 percent
 - 3. Diffusing specular surfaces: 75 percent

4. Laminated metallic film: 90 percent
- O. Lenses diffusers, covers, and globes: 100 percent virgin acrylic plastic or water white, annealed crystal glass, except as otherwise indicated. Greenish-tinted lenses are not acceptable. Heat resistant where required: borosilicate or pyrex glass
- P. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- Q. Lens Thickness: 0.125 inch (3 mm) minimum; except where greater thickness is indicated
- R. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.
- S. Fixture Support Components: Comply with Division 26 Section "Basic Electrical Materials and Methods
- T. Single-Stem Hangers: ½-inch (12-mm) steel tubing with swivel ball fitting and ceiling canopy. Finish same as fixture
- U. Twin-Stem Hangers: Two, ½-inch (12-mm) steel tubes with single canopy arranged to mount a single fixture. Finish same as fixture
- V. Rod Hangers: 3/16-inch (5-mm-) minimum diameter, cadmium-plated, threaded steel rod.
- W. Hook Hanger: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- X. Aircraft Cable: Stainless Steel, preformed 3/32" diameter, flexible Type 320/304 of 7x7 stranding, conforming to Military Specification Mil-W-83420. Adjustable by spring-loaded compression clamp
- Y. Track-Lighting Systems: Provide components, including track, fittings, and fixtures, from same manufacturer and as recommended by manufacturer for intended use.
 1. Maintain a continuity of conductors through feeds, splices, and boxes. The relative positions of live and neutral conductors must always be maintained along a continuous run so that track fittings connect into the track in a consistent manner.
 2. Install surface mounted track straight and true regardless of the ceiling contour.
- Z. Cast-in fixtures: Housings installed directly in concrete shall be fabricated of hot dip galvanized steel or cast aluminum. Where cast aluminum housings are used, give two coats of asphaltum paint prior to installation. To prevent direct contact of housing to concrete, 3mm thick x 51mm diameter solid neoprene grommets shall be furnished at every point light fixture surfaces are mounted to concrete structure

2.3 FIXTURE SUPPORT COMPONENTS

- A. Mountings, Fastenings, and Appurtenances: Corrosion-resistant items compatible with support components. Use materials that will not cause galvanic action at contact points. Use mountings that correctly position luminaire to provide indicated light distribution.

2.4 LAMPS AND LIGHT ENGINES:

- A. Color Temperature and Minimum Color-Rendering Index (CRI): 3000 K and 85 CRI, except as otherwise indicated.
- B. Color consistency shall be no more than 3-Step McAdam Ellipse
- C. Lamps and light engines of one type shall be from one manufacturer. Where indicated in the Lighting Fixture Schedule, lamps shall be supplied from the named manufacturer, only.

2.5 LAMP HOLDERS:

- A. Screw base: Screw base sockets for shall be of heavy duty heat resistant porcelain with spring center contacts and plated screw shells.
- B. LED Light engine mounting: Shall be designed for field service and replacement

2.6 LIGHT EMITTING DIAODES (LED):

- A. All LED sources used in the LED luminaire shall be of proven quality from established and reputable LED manufacturers and shall have been fabricated after 2020.
- B. Replacement and Spares: Manufacturer shall provide written guarantee of the following:
 - 1. Manufacturer will keep record of original bin for each LED module and have replacement modules from the same bin available for three (3) years after date of installation.
 - 2. Manufacturer will keep an inventory of replacement parts (source assembly, power and control components).
 - 3. Manufacturer's LED system will not become obsolete for ten (10) years: Manufacturer will provide exact replacement parts, or provide upgraded parts that are designed to fit into the original luminaire and provide equivalent distribution and lumen output to the original, without any negative consequences.
- C. All parts of system shall replaceable in field. Manufacturer shall provide written guarantee of the following:
 - 1. Manufacturer has in place a written recycling and re-use program, and will accept returned product and/or components for recycling or re-use.
 - 2. Manufacturer will properly dispose of non-recyclable components that are deemed harmful to the environment.
 - 3. System shall carry a full warranty for five (5) years. Manufacturer shall be responsible for cost of labor not to exceed \$50 per individual part, and cost of shipping, to replace any component of the system that fails within 2 years of installation.
- D. Products and Components – Performance
 - 1. LED luminaires and components shall be UL listed or UL classified.
 - 2. LED luminaires and components shall be CE certified.
 - 3. LED luminaires and components shall be PSE marked.

4. All LED luminaires shall be subjected to the following JEDEC Reliability Tests for Lead-free Semiconductors: HTOL, RTOL, LTOL, PTMCL, TMSK, Mechanical Shock, Variable Vibration Frequency, SHR, Autoclave.
5. To ensure luminaire quality, luminaire shall have been tested under accelerated life test conditions including an operating temperature span of 360 degrees F, and cyclic loading up to 60G.
6. All products included in system shall use Mil-Std 810F, Random Vibration 7.698g as a minimum standard. In installations subject to vibration, luminaire shall be installed with vibration isolation hardware to sufficiently dampen vibrations.
7. All LED components shall be mercury and lead-free.
8. All manufacturing processes and materials shall conform to the requirements of the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronics Equipment (RoHS) Directive, 2002/95/EC.
9. LEDs shall comply with ANSI/NEMA/ANSLG C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products. Color shall remain stable throughout the life of the lamp. Color shall match approved sample.
10. LEDs shall comply with IESNA LM-80 – Standards for Lumen Maintenance of LED Lighting Products
11. White LEDs shall have a minimum rated source life of 50,000 hours under normal operating conditions. RGB LEDs shall have a rated source life of 100,000 hours. LED "rated source life" is defined as the time when a minimum of 70% of initial lumen output remains.
12. Luminaire assembly shall include a method of dissipating heat so as to not degrade life of source, electronic equipment, or lenses. LED luminaire housing shall be designed to transfer heat from the LED board to the outside environment. Luminaire housing shall have no negative impact on life of components.
13. Manufacturer shall supply in writing a range of permissible operating temperatures in which system will perform optimally.
14. High power LED luminaires shall be thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware
15. LEDs shall be adequately protected from moisture or dust in interior applications.
16. For wet and damp use, LED-based luminaires itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure. Such protection shall have no negative impact on rated life of source or components, or if so, such reductions shall be explicitly brought to the attention of the designer.
17. All hardwired connections to LED luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
18. The LED luminaire shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.

19. RGB LED luminaires shall utilize an equal combination of high brightness red, blue and green LEDs, unless otherwise noted, to provide up to 16.7 million additive RGB colors and shall be capable of at least 8-bit control.
 20. Manufacturer shall be able to provide supporting documentation of the product meeting third party regulatory compliance.
 21. Manufacturer shall ensure that products undergo and successfully meet appropriate design and manufacturability testing including Design FMEA, Process FMEA, Environmental Engineering Considerations and Laboratory Tests, IEC standards and UL/CE testing.
 22. All LED luminaires (100% of each lot) shall undergo a minimum twenty-four (24) hour burn-in during manufacturing, prior to shipping.
 23. Manufacturer shall provide Luminaire Efficacy (lm/W), total luminous flux (lumens), luminous intensity (candelas) chromaticity coordinates, CCT and CRI. optical performance, polar diagrams, and relevant luminance and illuminance photometric data. Provide data in IES file format in accordance with IES LM-79-2008, based on test results from an independent Nationally Recognized Testing Laboratory.
- E. Unless otherwise specified, all LED sources shall have the following quality characteristics:
1. CRI: 85 or greater
 2. R9: 50 or greater
 3. SCDM: 3 or less.
- F. Power / data supply shall have the following:
1. Supply outputs shall have current limiting protection.
 2. Supply shall provide miswiring protection
 3. Supply shall have power factor correction.
 4. Supply shall provide connections that are conduit-ready or clamp-style connections in the case of low-voltage wiring.
 5. Supply shall come with a housing that meets a minimum IP20 rating for dry location installation unless located in a damp or wet location.
 6. Supply shall be UL listed for Class 1 or Class 2 wiring

2.7 LED DRIVERS:

- A. Underwriters Laboratories (UL) listed, Class P, Type 1.
- B. Drivers shall have audible noise rating of Class "A" except as otherwise indicated.
- C. Voltage: Match connected circuits.
- D. Lamp Flicker Freq \geq 100 Hz
- E. Lamp Flicker:
 1. % Flicker \leq Flicker Freq x 0.08 (normal populations)

2. % Flicker \leq Flicker Freq x 0.0333 (special populations)

- F. Minimum Power Factor: 90 percent.
- G. Drivers shall comply with all applicable local, state, and federal efficiency standards.
- H. For applications and where ambient temperature falls below 50° F, drivers shall be rated for 0° F or less.
- I. Dimming drivers shall provide smooth dimming over a minimum range from 100 to 1 percent light output (unless otherwise specified). Listed for use with specific dimming system provided.

2.8 TRANSFORMERS:

- A. Suitability: Drivers and transformers shall be of the best quality and sized to compensate for voltage drop over indicated distances and meet with the following requirements:
- B. Shall be electronic and matched to load type and size and be listed as compatible with lamp/led manufacturer
- C. All transformers shall be locally fused where required.
- D. Provide adequate ventilation to meet code and manufacturers requirements concerning temperature rise.
- E. Provide wet location enclosures for remote transformers located outdoors.
- F. For applications and where ambient temperature falls below 50° F, all lamps, light engines, drivers and transformers shall be rated for 0° F or less.

PART 3 - EXECUTON

3.1 INSTALLATION

- A. Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's written instructions and approved Shop Drawings. Support fixtures according to requirements of Division 26 Section "Common Work Results for Electrical."
- B. Fixture Attachment: Fasten to indicated structural supports.
- C. Fixture Attachment with Adjustable Features or Aiming: Attach fixtures and supports to allow aiming for indicated light distribution.
- D. Support for Recessed and Semi-recessed Grid-Type Fluorescent Fixtures: Provide minimum of two support wires to structure from opposite corners of grid type light fixtures. Do not depend on the ceiling grid system as the sole support for these fixtures.
- E. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corner.
- F. Fixtures Smaller than Ceiling Grid: Install a minimum of 4 rods or wires for each fixture and locate at corner of ceiling grid where fixture is located. Do not support fixtures by ceiling acoustical panels.

- G. Fixtures Shown Centered in Ceiling Tile: Center in acoustical panel. Support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
- H. Support for Suspended Fixtures: Brace pendants and rods over 48 inches (1200 mm) long to limit swinging. Support stem-mounted, single-unit, suspended fluorescent fixtures with twin-stem hangers. For continuous rows, use tubing or stem for wiring where emergency power is supplied from a central battery or generator system, or according to prevailing local codes. Use tubing or rod or cable for suspension for each unit length of chassis, including one at each end, as per specification.
- I. Provide all mounting components required for installation, including hickeys, stud-extensions, ball-aligners, canopies and stems.
- J. Provide stems on pendant fixtures of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field.
- K. Air-Handling Fixtures: Install with dampers closed.
- L. Installation Sequence: Install fixture mounting frames, plaster rings, etc. prior to the trim assembly, which shall not be installed until the project is "broom clean". Where the fixture location or construction does not permit sequential installation, all reflectors, lenses, flanges and other visible surfaces shall be carefully protected.
- M. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's instructions.

3.2 GROUNDING:

- A. Ground fixtures according to Division 26 Section GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

3.3 WIRING:

- A. Minimum standards: All wiring shall comply with the following standards:
- B. All wiring within lighting fixtures or from the splice with the building wiring shall be as specified under LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES.
- C. Wiring between fluorescent lamp holders and associated operating and starting equipment shall be of similar or heavier gauge than the leads furnished with the approved ballasts.
- D. Wire leads to the receptacle or connector of any side prong incandescent lamp or any "cool-beam" lamp, or any lamp 200 watts or over shall be SF-2 (silicone rubber insulated) stranded wire.
- E. Wiring within fixture construction is to be concealed, except where the fixture design or mounting dictates otherwise.
- F. Joints in wiring within lighting fixtures and connections of the fixture wiring to the wiring of the building shall be as specified under LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES with special attention to paragraphs relating to high amperage, low voltage conditions.
- G. Wiring channels and wireways shall be free from projections and rough or sharp edges throughout, and at all points or edges over which conductors must pass and may be subject to injury or wear.

- H. Insulated bushings shall be installed at points of entrance and exit of flexible wiring.

3.4 **CONNECTIONS:**

- A. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values.

3.5 **FIELD QUALITY CONTROL:**

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Give advance notice of dates and times for field tests.
- C. Provide instruments to make and record test results.
- D. Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source.
 - 1. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.
 - 2. Report results of tests.
- E. Replace fixtures that show evidence of corrosion during Project warranty period.

3.6 **CLEANING AND ADJUSTING:**

- A. Clean fixtures after installation: Remove all protective strippable coatings, dust, finger marks, paint spots and any materials deleterious to the appearance or functioning of the fixtures. Use methods and materials recommended by manufacturer. Abrasive cleaners are not permitted.
- B. Focusing and adjustment: After installation of all lighting fixtures, finishes and furnishings has been completed, provide personnel, ladders or lifts, spare lamps and any other equipment necessary to expeditiously focus all lighting. Focusing shall be performed after dark, unless all visible daylight can be screened out of the focusing area, and shall take place under supervision of the Lighting Designer, Architect and/or Owner except where specific aiming diagrams and/or scene programming data have been provided within the Contract Documents. All work shall be performed in accordance with union rules, should they be in force, and applicable codes.
 - 1. Aim all adjustable lighting fixtures according to instructions.
- C. Program preset dimming system "scene" lighting levels, where applicable.

3.7 **FINAL INSPECTION:**

- A. Upon completion of the installation, lighting equipment must be in first class operating order and free from defects in condition and finish
- B. At time of final inspection, all fixtures and equipment must be installed and lamped with new lamps and be complete with all lenses, diffusers, reflectors, side panels, louvers or other necessary components.
- C. Fixtures shall be completely clean and free from finger marks, dust, plaster or paint spots.
- D. Any reflectors, lenses, diffusers, side panels or other parts damaged prior to the final inspection shall be replaced.
- E. Housings shall be rigidly installed and adjusted to a neat flush fit with the ceiling.

- F. No light leaks shall be permitted at the ceiling line or from any visible part or joint

END OF SECTION 26 51 00

SECTION 272000 – TELEPHONE/DATA SYSTEMS

PART 1 - GENERAL

RELATED DOCUMENTS

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

QUALITY ASSURANCE

Manufacturers: Firms regularly engaged in manufacture of telecommunications systems, of types and ratings required in this Section, whose products are Listed and Labeled for the purpose intended. Subject to compliance with requirements provide telecommunications system products equivalent to one of the following:

Leviton
Commscope
Amp Products
Superior Essex
Optical Cable Co.
Corning Inc.

Codes and Standards:

Electrical Code Compliance: Comply with applicable state code requirements of the authority having jurisdiction and appropriate NEC articles as applicable to the indicated equipment.

NEMA Compliance: Comply with applicable requirements of the National Electrical Manufacturers Association standard NEMA WC 66-1999, Performance Standard for Category 6 and Category 7 100-Ohm Shielded and Unshielded Twisted Pair Cables.

TIA/EIA Compliance: Comply with applicable requirements of TIA/EIA 568-B standards, TIA/EIA 569-A and TIA/EIA-607.

BICSI Compliance: Comply with applicable requirements of BICSI Telecommunications Distribution Methods Manual (TDMM).

Testing Laboratory Compliance: Comply with applicable requirements of relevant UL standards. Provide equipment that is Listed and Labeled.

Special-Use Markings: Provide equipment, constructed for special use, with appropriate Listed marks that indicate suitability for special type of use or application indicated.

State STS-1000 Compliance: Data wiring associated with state projects shall meet all applicable criteria of the latest edition of "North Carolina State STS-1000 Telecommunications Guidelines".

ASU University Communications Standards 2022.

SUBMITTALS

Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal requirements are defined in each section of this Division.

Shop drawings for the system shall be submitted in a single package and shall include:

Product Data: Submit manufacturer’s technical product data including specifications and installation instructions, for each component of the system required. Include data substantiating that equipment and materials comply with requirements. Literature shall indicate the function of each item and shall be cross-referenced to the Block Diagram.

Block Diagram: Submit a Block Diagram of the system showing all components and all connections. The Block Diagram shall clearly indicate all items that are supplied under other sections of these Specifications. Block Diagram shall show typical outlets and cables to each type of outlet. Block Diagram shall show layout of distribution frame including type of enclosure each type and quantity of distribution equipment. (Patch panels, splitters, etc.) to each distribution frame.

Installer’s Qualifications: Firm with a minimum of five years documented successful installation experience on projects utilizing cabling infrastructure work similar in scope, complexity and size, to that required for this project. The Installer shall be an experienced firm regularly engaged in the layout and the installation of cabling infrastructure systems. The Installer must be able to show evidence that he has successfully completed projects of similar size and scope in the last 12 months. The Installer shall be a manufacturer certified installer for the products installed under this Section. Installer, supervisors, and designers shall have a current valid certification card.

The Installer’s Project Manager must have experience in this type of project and he/she shall be expected to provide technical support.

The Installer’s Project Manager shall attend the monthly progress meetings held by the state and additional meetings as scheduled or required.

PART 2 - PRODUCTS

OUTLET JACKS

Outlet jacks shall be modular with keystone snap-in modules capable of numerous jack module combinations including RJ45, and fiber LC Connectors. All combinations shall be capable of fitting on a single gang cover plate. Outlet combinations as shown on the drawings shall be composed of jacks that serve cables meeting the requirements outlined in this Section.

CABLE

General: All Categories of cabling shall meet the TIA / EIA 568-B and 598 standard. Inside Plant fiber cable shall comply with ANSI / ICEA S-83-596. Outside Plant fiber cable shall comply with ANSI / ICEA S-87-640.

Category 6

Frequency MHz	Attenuation dB/100m	Next dB/100m	ACR dB/100m	PS-NEXT dB/100m	PS-ACR dB/100m	Return Loss dB/100m	ELFEXT dB/100m	PS-ELFEXT dB/100m
1	2.0	74.3	72.3	72.3	70.3	20.0	67.8	64.8
4	3.8	65.3	61.5	63.3	59.5	23.0	55.8	52.8
10	6.0	59.3	53.3	57.3	51.3	25.0	47.8	44.8
16	7.6	56.2	48.6	54.2	46.6	25.0	43.7	40.7
20	8.5	54.8	46.3	52.8	44.3	25.0	41.8	38.8
25	9.5	53.3	43.8	51.3	41.8	24.3	39.8	36.8
31.25	10.7	51.9	41.2	49.9	39.2	23.6	37.9	34.9
62.5	15.4	47.4	32.0	45.4	30.0	21.5	31.9	28.9
100	19.8	44.3	24.5	42.3	22.5	20.1	27.8	24.8
200	29.0	39.8	10.8	37.8	8.8	18.0	21.8	18.8
250	32.8	38.3	5.5	36.3	3.5	17.3	19.8	16.8

Notes:

1. Values are specified or calculated, based upon TIA 568-B.2-1.
2. Attenuation values are maximum acceptable levels. All other values are minimum levels at indicated frequency.

TERMINATION

Copper Patch Panels: Provide 48 port, rack mountable, modular panels filled with black or yellow keystone Cat6/Cat6A jacks. All jacks to be wired to TIA/EIA 568B wiring scheme.

PART 3 – EXECUTION

GENERAL

Route all cables in raceway within walls and inaccessible ceiling spaces.

Use nylon bushings at top of conduit where stubbed in accessible ceiling spaces.

Support all cables using cable tray, or J type hooks where cable tray is not available.

All cables shall be terminated using appropriate termination equipment.

Provide appropriate cable management devices in all distribution frames to insure a neat appearance. The use of cable ties is prohibited.

No horizontal cable length shall exceed 250 feet from the patch panel at the MDF or IDF to the outlet.

UTP TESTING

Category 6: Cable runs shall be tested for conformance to Level III parameters as specified TIA / EIA 568 B.2 and TIA / EIA Telecommunications System Bulletin (TSB) 67.

Test all cable pairs for the following conditions:

1. Polarity
2. Reversal of pairs
3. Wire transpositions
4. Continuity
5. Opens
6. Shorts

Test twisted pair cabling for each of the following parameters:

1. Wire Map (continuity)
2. Insertion Loss
3. Length
4. NEXT loss, pair-to-pair, measured from local end
5. NEXT loss, pair-to-pair, measured from far end
6. NEXT loss, power sum, measured from local end
7. NEXT loss, power sum, measured from far end
8. ELFEXT, pair-to-pair
9. ELFEXT, power sum
10. Return loss, measured from local end
11. Return loss, measured from far end
12. Propagation delay
13. Delay skew
14. ACR
15. Power Sum (PSACR).

1 Document all test data and submit to the engineer for review and approval prior to final review. Provide a summary
2 form at front of documentation that identifies each cable tested, test results (passed, failed) and cable distance.
3 Documentation approved by the engineer will be submitted to the Owner at the time of acceptance.
4
5

6 **TELECOMMUNICATIONS LABELING**

7
8 ANSI/TIA/EIA 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings is
9 incorporated by reference and is to be complied with.
10

11 Each pathway (conduit, tray, raceway, etc.) that conveys telecommunications media from space to space must be
12 given a unique identifier and labeled at each end-point.
13

14 Each telecommunications space (equipment room, telecommunications closet, work area, entrance facility, manhole
15 and handhole) must be uniquely identified and labeled. Provide phenolic labels on each distribution frame, cabinet,
16 enclosure or rack.
17

18 Each cable must be uniquely identified and labeled at each end with machine printed 3/4" or larger labels.
19

20 Each cable record must indicate the cable type by manufacturer and manufacturer's designation, and document
21 every pair/conductor in the cable. Cable identifier must be linked to all pathways in which it runs.
22

23 Each outlet is to be labeled. Labels are to be printed or typed. Provide self-adhesive labels unless provision for
24 labeling is integral to the outlet.
25

26 Each piece of termination hardware such as a patch panel or wiring block must be uniquely named and labeled. Use
27 printed self-adhesive labels. Label each patch panel port with room number and location of corresponding jack.
28

29 Termination position on cross-connect must be identified by type, the pair/conductor terminated and a user code.
30

31 Each work area is labeled with a unique identifying number. A consistent labeling and numbering scheme shall be
32 used. The labeling shall be clearly legible **on** the outlet face and the termination end. The numbering plan should
33 identify the source and destination of the cable for horizontal runs. A sample number plan is:
34

35 208A-A1/241B
36

37 Where 208 is the telecommunications closet room #:

38 "A" is the patch panel identification,

39 "A1" is the "A" Block and the first position,

40 "241" is the workstation room #,

41 and "B" is the work space of the user in room 241.
42

43 Horizontal cable shall be labeled at the workstation end and the cross-connect end. Backbone cables (whether riser
44 or horizontal) shall have an identifying number that is labeled at each end. Labels shall be the same color on each
45 end. Performance documentation must use the same labeling scheme.
46
47

48 **CLOSEOUT**

49
50 The Contractor shall provide the Owner with a report outlining all tests previously noted. The Contractor shall provide
51 a block diagram identifying all distribution frames, cabinets, backboards and the size and number of cables and
52 conduits between each, as well as an outline of each unique type of outlet and connecting cable.
53

54 Provide minimum of a 25-Year Cabling System Warranty from the system Manufacturer. This warranty shall
55 guarantee end-to-end system performance, shall cover both components and cabling, and shall cover materials and
56 labor. This type of warranty, available from various system manufacturers, requires that installers be approved by,
57 and registered with the system manufacturer.
58
59

60 **END OF SECTION 272000**

Appalachian State University Cabling System Technical Specification Communications

1.0 INTRODUCTION

1.1 PURPOSE

The intent of this document is to provide a standard specification that will be used for all Appalachian State University facilities requiring cabling installation. This document provides the minimum performance criteria for the components and sub-systems comprising a complete cabling system that shall accommodate Appalachian State University's requirements.

Product specifications, general design considerations, and installation guidelines are provided in this written document. The successful contractor shall meet or exceed all requirements for the cabling system described in this document.

Appalachian State University's cabling infrastructure requires a CommScope Uniprise Cabling Systems performance warranty or equivalent Single Manufacturer Solution. The Category 6 and Cat6A portion of the cabling system shall comply with the link and channel performance requirements of the latest revision and addendum of TIA-568-C.1, "Commercial Building Telecommunications Cabling Standard" and 568-C.2, "Balanced Twisted-Pair Telecommunications Cabling and Components Standard".

The successful contractor must have a BICSI® certified RCDD review the drawings and meet with University representatives from Facilities and the Information Technology Services (ITS) to discuss the project and to ensure that a structured cabling system is installed that provides a comprehensive telecommunications infrastructure.

1.2 SCOPE

This document defines the cabling system and subsystem components to include cable, termination hardware, supporting hardware, and miscellaneous items to install a complete telecommunications system supporting voice and data. The intent of this document is to provide all pertinent information to allow the contractor to bid the materials, labor, supervision, tooling, and miscellaneous mounting hardware and consumables to install a complete system. However, it is the responsibility of the contractor to identify any and all items required for a complete system not identified in this specification.

1.3 APPLICABLE DOCUMENTS

The cabling system described in this specification is derived in part from the recommendations made in industry standard documents. The documents below are incorporated by reference.

- 1) This Technical Specification and Associated Drawings
- 2) ANSI/J-STD-607-A, *Commercial Building Grounding and Bonding Requirements for Telecommunications*
- 3) TIA-568-C.2 *Balanced Twisted-Pair Telecommunications Cabling and Components Standard*
- 4) TIA-568-C.1, *Commercial Building Telecommunications Cabling Standard*
- 5) TIA-569-D, *Commercial Building Standard for Telecommunications Pathways and Spaces*
- 6) TIA-606-C, *Administration Standard for Telecommunications Infrastructure*
- 7) TIA-607-B, *Telecommunications Grounding and Bonding*
- 8) TSB-140, *Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems*
- 9) Building Industries Consulting Services International (BICSI) *Telecommunications Distribution Methods Manual (TDMM)* – latest edition
- 10) National Fire Protection Agency (NFPA) – NFPA 70, *National Electrical Code (NEC)*

If a conflict exists between applicable documents, then the order in the list above shall dictate the order of precedence in resolving conflicts. This order of precedence shall be maintained unless a lesser order document has been adopted as code by a local, state or federal entity, and is therefore enforceable as law by a local, state or federal inspection agency.

2.0 TELECOMMUNICATIONS SYSTEM REQUIREMENTS

2.1 FACILITIES DESCRIPTION

Appalachian State University's facilities vary in function and size. Most buildings have individual offices for faculty and staff; in certain areas, personnel may be situated in modular office furniture with hard wall offices around the exterior of the floor. Classrooms may have fixed seating or be large open rooms. Generally, a ceiling distribution cabling system using cable trays and conduits is used. These specifications apply primarily to new buildings and major renovations, but should be followed as closely as possible for all telecommunications cabling installations.

Single mode fiber optic backbone shall be employed between the data Main Cross-Connect (MC) and each telecommunications room (TR) for data connectivity in all new buildings. When applicable, high pair-count Category 3 CMR riser cables are employed between the voice MC and each TR for voice connectivity. Within the data MC and each TR, backbone fiber strands shall be terminated and housed in rack-mount fiber optic enclosures. Within the voice MC and each TR, backbone copper pairs shall be terminated using 66-blocks mounted on 4' x 8' x .75" virgin fire retardant plywood.

2.2 TELECOMMUNICATIONS SYSTEM DESCRIPTION

Appalachian State University's data distribution network is based on a star topology. As a standard configuration, each work area communications outlet contains two Category 6 jacks, all jacks are terminated using Category 6 horizontal cables pulled and terminated on Category 6 insulation displacement connector patch panels in the telecommunications room. Patch cords/equipment cords are used to connect each jack to the appropriate service connector. Generally, high pair count Category 3 CMR or CMP backbone/riser cables are

employed between the Entrance facilities or Main telecommunications room and each telecommunications room for voice connectivity. Category 6 cables and single mode fiber optic cables are used as backbone/riser cables for data.

2.3 SPECIAL REQUIREMENTS

While standards are carefully monitored to ensure that the components and practices are technologically current, it is possible that some applications may require special consideration. Many buildings contain special purpose facilities and equipment with unique telecommunications requirements. Special telecommunications requirements may require deviation from these specifications. Information Technology Services needs to be notified of these special requirements as early in the design process as possible.

The following list contains some of the facilities that typically require special telecommunication consideration.

- Computer labs or classrooms
- Video conference rooms
- Laboratories
- Research or Science equipment
- Areas containing E-Boards (Digital Signage)
- Information Kiosks
- Data centers or server rooms
- Offices requiring CCTV or video playback

Items not specifically identified in this document as a standard should obtain approval from appropriate Information Technology Services staff prior to implementation.

3.0 BUILDING ENTRANCE FACILITIES

The entrance facility is the location where the pathways for communications services penetrate the building to connect to the voice and data systems within the building. The entrance facilities are generally 4-inch rigid steel conduit that extends from the perimeter of the building to the telecommunications main equipment room.

3.1 CONDUIT ROUTING

Appalachian State University representatives shall designate the shortest practical route for the communications cable to connect from the building to the point of connection with the university telephone and network cabling systems. Conduit shall be installed from the facility points of entry to the telecommunications infrastructure as determined by Information Technology Services.

3.2 FACILITIES ENTRANCE DIVERSITY

Special facilities entrance requirements may be necessary for some new buildings that will house voice and data equipment when Appalachian State University representatives determine that the scope and importance of the facility require it.

In the event that diverse cable facility entrances are not deemed necessary, provisions shall be made for no less than four 4-inch conduits for access from the university cable system to the telecommunications main equipment room. No less than two 4-inch conduits should exit the building from different locations for the purpose of providing redundant routes. Each of these conduits must be labeled "TELE MDF ONLY" and connect to the university telecommunications infrastructure.

Entrance facilities must adhere to all BICSI requirements. Information Technology Services must approve any deviations from the BICSI TDMM.

4.0 INTERBUILDING BACKBONE RISER FACILITIES

4.1 DESIGN CONSIDERATIONS

- The interbuilding backbone shall be comprised of both copper and optical fiber. Cable sizing shall be in consultation with Information Technology Services for specific building requirements.
- Interbuilding backbone fiber and copper cables shall be sized to include no less than 50% spare for future use. Consult with Information Technology Services for cable sizing requirements on a per building basis.
- Interbuilding backbone cables comprised of steel or metallic parts must be grounded on both ends of the cable as specified in section 11.0, —Grounding and Bonding.
- Proper firestopping of all backbone pathways shall be maintained as specified in section 10.0, —Firestop Systems.
- Interbuilding copper and backbone cables shall be installed without exceeding the minimum bend radius and the maximum vertical rise recommended by the cable manufacturer and must not exceed the maximum allowed pulling tension of the cable(s).

4.2 INTERBUILDING BACKBONE COPPER (RISER)

4.2.1 CABLING

- The interbuilding copper backbone cable(s) shall be 100-ohm unshielded, balanced, twisted-pair, Category 3 cable with round solid conductors. It shall also be armored.
- The cable shall be UL[®] tested and listed, and it shall meet or exceed the requirements of Category 3 cable as specified in TIA-568-C and all applicable national and municipal fire codes.

4.2.2 TERMINATIONS

- Interbuilding backbone copper cabling shall be terminated on 66 protected termination blocks in the telecommunications riser rooms. Main Communication room terminations must be done in accordance with Information Technology Services standards.
- The cable shall be continuous without splices, unless required by code or specified differently by Information Technology Services.
- Interbuilding copper backbone cables must be properly secured to the walls to prevent horizontal movement as specified in BICSI TDMM Chapter 4, the NEC, and all applicable national and municipal codes.

4.3 INTERBUILDING BACKBONE FIBER OPTIC

4.3.1 CABLING

- The interbuilding fiber backbone cable(s) shall be single mode optical fiber. There shall be no fewer than 12 strands of single mode fiber. Actual cable sizing shall be determined after consultation with Information Technology Services.
- Optical fiber cables shall meet or exceed all applicable national and local building fire codes.

4.3.2 FIBER TERMINATIONS

- The interbuilding optical fiber backbone cable(s) shall be installed with a service loop of no less than 25 feet at each end.
- Interbuilding fiber backbone cables must be properly secured to the walls to prevent movement as specified in BICSI TDMM Chapter 5 (latest edition), the NEC, and all applicable national and local building codes.
- Velcro cable ties shall be used for securing fiber optic cable.
- All fiber optic cables are to be continuous without splicing, unless otherwise specified by Information Technology Services.
- All terminations should be made using LC connectors unless otherwise noted in this document or in writing from an Appalachian State University representative.
- Fiber optic cabinets shall be labeled according to Information Technology Services labeling scheme. Contact Information Technology Services for the correct designation.

4.3.3 FIBER-OPTIC ENCLOSURES

- Fiber-optic rack-mounted enclosures shall consist of an EIA-approved 19-inch enclosure (with optional extensions to fit in a 23-inch rack) that is four rack units tall (7 inches) with a minimum of 72 duplex port capacity.
- Individual fiber couplers must be removable from the panel.
- Individual couplers must be replaceable without causing interruption of service to adjacent fiber strands.
- Dust covers must be provided for any unused couplers in each enclosure.
- The enclosure shall be black.
- Enclosures shall be labeled per Information Technology Services specifications.

4.4 INTERBUILDING BACKBONE ROUTING

Interbuilding backbone conduit routes shall be determined by Information Technology Services as close to project completion as possible to most adequately connect to infrastructure existing at that time.

5.0 HORIZONTAL DISTRIBUTION SUBSYSTEM

The horizontal distribution system consists of two basic elements, the horizontal pathways and the related spaces, and the horizontal system.

5.1 TELECOMMUNICATIONS PATHWAYS AND SPACES

Electrical contractors will generally be the installer of the telecommunications pathways, primarily cable tray, conduit and outlet boxes. The drawings must clearly define the pathways and spaces. The BICSI® Telecommunications Distributions Methods Manual covers all parts of the telecommunications structured cabling system and will be used by Appalachian State University representatives to ensure proper installation. It should also be referenced by the designer and the contractors to determine: Telecommunications room location, dimensions, equipment layout and furnishings. Heating, cooling, lighting, fire protection, power and grounding requirements.

The number and size of slots, sleeves, and conduits needed to provide pathways for backbone cabling and determine fill ratios. These pathways and spaces are designed to be used for the life of the building and should be sized accordingly. There must be at least one telecommunications room per floor in all buildings and they must be stacked vertically in multi-floor buildings. These telecommunications rooms are designed to be secure designated spaces for housing specialty equipment and devices and should not be used or combined with any other services such as plumbing, electrical, HVAC, housekeeping or storage.

5.2 TELECOMMUNICATIONS CABLING SYSTEM

The telecommunications contractor will be responsible for pulling and terminating the cables following all federal, state and local codes, accepted industry standards and the manufacturer's instructions. The telecommunications contractor must work closely with the electrical contractor to ensure that the pathways are installed correctly and that they will allow for proper installation of the cabling system. Visual inspections and upon completion of the project test results will be used to verify proper installation practices were followed.

Each telecommunications outlet (TO) location, unless otherwise noted, shall be provided with two Category 6 cables. Each Category 6 cable shall be terminated on an 8-position, 8-conductor Category 6 jack to the T568B color code in the work area and in the telecommunications room.

5.2.1 WORK AREA TELECOMMUNICATIONS OUTLETS

No less than one work area communications outlet should be placed per 100 square foot increment of useable floor space and sized to accommodate two Category 6 cables and connectors (e.g. A 90 square foot room should have at least one, a 101-square foot. room should have at least two). Outlets should be within 3' of an electrical outlet and installed at the same height, unless otherwise specified. Outlets should be placed so that the work area or workstation cable does not exceed 5 meters (16 ft) in length. This length is figured into the total horizontal cabling length and must not be exceeded.

OFFICE OUTLETS

No less than two multiport faceplates in each office. Each faceplate shall contain no less than two Category 6 cables terminated on two Category 6, 8-position, 8-conductor jacks. Faceplates shall be constructed of ABS molding compound. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each. Faceplates shall be ivory in color unless otherwise noted.

ACADEMIC ROOM OUTLETS

No less than two multiport faceplates in each academic room. Each faceplate shall contain no less than two Category 6 cables terminated on Category 6, 8-position, 8-conductor jacks. Faceplates shall be constructed of ABS molding compound. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each. Faceplates shall be ivory in color unless otherwise noted.

~~DORM OUTLETS~~

~~No less than two multiport faceplates in each dorm room. Each faceplate shall contain no less than two Category 6 cables terminated on two Category 6, 8 position, 8 conductor jacks. Faceplates shall be constructed of ABS molding compound. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each. Faceplates shall be ivory in color unless otherwise noted.~~

WIRELESS OUTLETS

Two Category 6 cables terminated on Category 6, 8-position, 8-conductor jacks. Faceplates shall be constructed of ABS molding compound. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each. Where wireless access points are located on an accessible lay-in style ceiling surface, two Category 6 cables terminated on Category 6, 8position, 8-conductor jacks shall be left at each location with 10' excess neatly coiled and supported above the ceiling.

5.2.2 PRODUCT SPECIFICATIONS

~~CATEGORY 6 CABLING – NON-PLENUM~~

~~Horizontal cabling shall be 23 AWG, 4-pair UTP, UL/NEC CMP rated, with a blue PVC jacket. Cable jacketing shall be lead-free.~~

CATEGORY 6 CABLING – PLENUM

Horizontal cabling shall be 23 AWG, 4-pair UTP, UL/NEC CMP rated, with a blue plenum-rated PVC jacket. Individual conductors shall be FEP insulated. Cable jacketing shall be lead-free.

MODULAR JACKS

All modular jacks shall be wired to the T568B wiring pattern. Modular jacks shall be constructed with a housing of polyphenylene oxide, 94V-0 rated. Modular jacks shall be terminated using a 110-style pc board connector (made of 94V-0 rated polycarbonate), color-coded for both T568A and T568B wiring. The 110-connector shall terminate 22-24 AWG solid conductors with a maximum insulation diameter of .050 inches. The modular jack contacts shall be plated with a minimum of 50 micro-inches of gold in the contact area over a 50 micro-inch minimum nickel underplate.

Category 6 modular (data) jacks shall be unkeyed 4-pair and shall fit in a .760" X .582" opening. Modular jacks shall be terminated using a 110-style pc board connector, color-coded for both T568A and T568B wiring. Each jack shall be wired to T568B.

5.2.3 Work Area Communications Outlet Installation

All outlets shall be installed in the following manner:

- Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturers bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack may be neatly coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

In addition, each cable type shall be terminated as indicated below:

- Cables shall be dressed and terminated in accordance with the recommendations made in the BICSI® Telecommunications Distributions Methods Manual, manufacturer's recommendations and/or best industry practices.
- Pair untwist at the termination shall not exceed .25 inch for Category 6 connecting hardware.
- Bend radius of the cable in the termination area shall not be less than 4 times the outside diameter of the cable.
- The cable jacket shall be maintained as close as possible to the termination point.

5.3 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

- Cable shall be dressed and installed in accordance with manufacturer's recommendations and best industry practices
- Cable raceways shall not be filled greater than the NEC maximum fill for the particular raceway type
- Cables shall be installed in continuous lengths from origin to destination (no splices) unless specifically addressed in this document
- Where cable splices are allowed, they shall be in accessible locations and housed in an enclosure intended and suitable for the purpose
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded
- If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of four-foot intervals - at no point shall cable(s) rest on acoustic ceiling grids or panels
- Horizontal distribution cables shall be bundled in groups of not greater than 40 cables (cable bundle quantities in excess of 40 cables may cause deformation of the bottom cables within the bundle)
- Panel terminations shall be fed by and individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- Cable shall be installed above fire-sprinkler and systems and shall not be attached to the system or any ancillary equipment or hardware
- The cabling system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices
- Cables shall not be attached to ceiling grid or lighting support wires
- Where light support for drop cable legs is required, the Contractor shall install clips to support the cabling
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the Contractor prior to final acceptance at no cost to the Owner
- Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification
- The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate. Cable labels shall not be obscured from view.
- Unshielded twisted pair cable shall be installed so that there are no bends less than four times the cables outside diameter (4 X cable O.D.) at any point in the run
- Pulling tension on 4-pair UTP cables shall not exceed 25-pounds for a single cable or cable bundle

5.4 HORIZONTAL CABLE TERMINATION

5.4.1 PATCH PANEL TERMINATION SPECIFICATIONS

All horizontal cables will be terminated on Flat Modular Category 6 patch panels in the telecommunications room. The horizontal cables termination patch panels shall be contained in standard 19" x 7' rack(s), wall-mount racks or equipment cabinets as specified by the project drawings. All equipment racks shall be properly secured to the floor or wall and augmented with horizontal and vertical management hardware, both front and rear, to properly dress horizontal cables. Patch panels shall provide 48 modular jack ports, wired to T568B. Spare jacks shall be provided for any unused ports on modular patch panels. The front of each module shall be capable of accepting 9mm to 12mm labels.

Each patch panel shall be separated on the rack by a 2U horizontal finger duct cable management panel.

5.4.2 HORIZONTAL CABLE SUPPORT

A 12" ladder rack system shall be installed in the telecommunications room to support the cables. The ladder should encompass the room allowing the cables to be properly dressed and supported. Secure the top of all freestanding equipment racks using 12" ladder racks to the wall or intersect with the ladder system encompassing the room.

5.4.3 CROSS-CONNECT SYSTEM

All horizontal cables will be terminated on Category 6 patch panels. This allows any cable to be used for voice, data or other purpose. Cross-connects will be done by using patch cords in the telecommunications room to connect a jack on the horizontal cabling system Category 6 patch panel to either network equipment or a patch panel designated for voice or other use in the equipment racks. For voice applications, the cable will be terminated using 66 type cross-connect block on the telecommunications back board (TBB) adjacent to the phone demark. Voice cross-connects for dial tone will be made here using standard cross connect wire. By using backbone cables between telecommunications rooms, voice connections can be made throughout the building using this system. Appalachian State University Network Services will install all equipment cables and patch cords used in the telecommunication room for data connectivity. All voice or other system cross-connect cables must be provided by that system provider. All patch cords other than voice or data must be clearly labeled and identified by the installer.

6.0 BACKBONE DISTRIBUTION SYSTEM

The MC and each TR, unless otherwise noted, shall house both voice and data backbone cabling and active equipment to support networking requirements. The MC shall be the main point of entry for outside services as well as main distribution point for all backbone cabling. Each TR will receive both voice and data cabling from the MC. The types and number of cables used for backbone systems will vary for each project and must be documented in the project specifications and documented on the drawings. Any termination or splice enclosures used for optical fiber will be listed in the specifications and documented on the drawings.

6.1 MAIN CROSS-CONNECT AND TELECOMMUNICATIONS ROOMS

All copper backbone cables shall be installed in the following manner:

- Backbone cables shall be installed separately from horizontal distribution cables.
- Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits or in separate innerduct within conduit.
- Where cables are installed in an air return plenum, the cable shall be installed in conduit, or plenum cable shall be installed in a plenum innerduct to provide protection to the cable.
- Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

For optical fiber backbone cables:

- Do not exceed the cable's minimum bend radius. Bending cable tighter than the minimum bend Radius may result in increased optical fiber attenuation or fiber breakage.
- The minimum bend radius for indoor backbone optical fiber cable is 10 times the cables outside diameter under no load conditions and 15 times the cables outside diameter when being pulled.
- Do not exceed the cables maximum vertical rise and tensile rating.
- Where cables are installed in an air return plenum, the cable shall be installed in conduit, or plenum cable shall be installed in a plenum innerduct to provide protection to the cable
- Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables use innerduct whenever possible.

NOTE: Do not locate backbone cable pathways in elevator shafts. Do not over fill conduits, ducts or sleeves. Refer to the BICSI® *Telecommunications Distributions Methods Manual*, latest edition for more information.

8.0 TELECOMMUNICATIONS SPACES

The telecommunication closets shall house racks, voice termination fields, and required cable routing hardware. Racks shall be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side. If one mounting rail of the rack is placed against a wall, the mounting rail shall be no closer than 6" to the wall to allow room for vertical management. Where there is more than one rack, the racks shall be ganged with vertical management hardware to provide interbay management. Ganged rack frames will be placed in a manner that will allow a minimum of 3 feet of clearance from the front and rear mounting surfaces and on one side of the ganged assembly.

In all closets the racks shall be on the opposite side of the room from the voice termination fields. Voice termination fields shall be mounted on 4' x 8' x .75" virgin fire retardant plywood, unless otherwise noted in drawings, and shall be on the opposite side of the room from the room entrance. Backbone termination fields shall be mounted to the left of the horizontal voice fields. Conduits with 4" minimum diameter shall be used in all closets. Conduits for data backbone shall be located adjacent to the racks and conduits for voice shall be located adjacent to the voice termination fields. The Contractor shall provide innerduct for all backbone fiber runs. Contractor shall provide required ladder and wall-mount management rings to properly support and dress cables from conduits to racks and frames.

8.1 INSTALLATION SPECIFICATIONS

Racks shall be installed in the following manner.

- Racks shall be securely attached to the concrete floor using 3/8" hardware
- All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 11.0 of this document
- Rack mount screws (#12-24) not used for installing fiber panels and other hardware shall be bagged and left with the rack upon completion of the installation
- Voice termination fields shall be mounted on 4' x 8' x .75" virgin fire retardant plywood that is mounted vertically at 12" A.F.F.
- Wall mount equipment racks shall have a minimum equipment depth of 22", and all electrical outlets shall be installed within the cabinet.

8.2 POWER REQUIREMENTS

The MC and each TR shall have the following minimum power configuration:

- Two 30A 250V NEMA L6-30 receptacles mounted horizontally within 12" of the hardware rack for each 350 data terminations. Each receptacle shall consist of two dedicated circuits.
- Two 20A 120V NEMA L5-20 receptacles mounted horizontally within 12" of the hardware rack for each 350 data terminations. Each receptacle shall be on a dedicated circuit.
- Two sets of Quad 20A 120V NEMA 5-20 receptacles at each voice termination plywood. Each set of quad receptacles shall be on a dedicated circuit.

9.0 CABLING SYSTEM TESTING

All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. All conductors and fibers of each installed cable shall be verified useable by the Contractor prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed-through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all installed cables.

All cables shall be tested in accordance with this document, the ND&I Contract agreement, and best industry practices. If any of these are in conflict, the Contractor shall be responsible to bring any discrepancies to the attention of the project team for clarification and/or resolution.

9.1 PERFORMANCE VERIFICATION

9.1.1 COPPER

Category 6 data cable shall be performance verified using an automated test set. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA Standard currently TIA-568-C, and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved.

9.1.2 FIBER

All 50/125 μ m single mode optical fiber must be manufactured by Corning Cable Systems or equivalent manufacture. After installation, it must be performance verified using an automated test set. Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA Standard currently TIA-568-C, and the results shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved.

10.0 FIRESTOP SYSTEMS

A firestop system is comprised of the item or items penetrating the fire-rated structure, the opening in the structure and the materials and assembly used to seal the penetrated structure. Firestop systems comprise an effective block for fire, heat, vapor and a pressurized water stream.

Firestop methods should be employed that meet the requirements of all applicable codes and/or laws.

11.0 GROUNDING AND BONDING

The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential for acting as a current-carrying conductor. The TBB shall be installed independently of the building electrical ground and shall be designed in accordance with the recommendations contained in the TIA-607-B, Telecommunications Bonding and Grounding Standard.

The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications closet shall be provided with a telecommunications grounding bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

11.1 PRODUCT SPECIFICATIONS

All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TC or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors. Where metallic panels attached to the rack do not have sufficient metal to metal contact to provide an adequate path to ground, they shall be bonded to the rack using a minimum #14 AWG copper conductor. The copper conductor size shall be upgraded based on the largest power conductor

feeding any rackmount equipment. The conductor shall be continuous, attaching all isolated components in a daisy chain fashion from top to bottom and bonded to the rack using an appropriate compression connector.

All wires used for telecommunications grounding purposes shall be identified with green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

11.2 GROUND SYSTEM INSTALLATION

The TBB shall adhere to the recommendations of the TIA-607-B standard, and shall be installed in accordance with best industry practices. Installation and termination of the main bonding conductor to the building service entrance ground, at a minimum, shall be performed by a licensed electrical contractor.

12.0 RACEWAY/TRAY SYSTEMS

The general requirements for raceway/tray systems are as follows:

- Communication tray systems shall be for exclusive use by Information Technology Services and Media Services.
- The systems shall be designed for no more than 40% fill for the expected life of the building.
- The systems must be metallic and continuous, and all separate pieces must be bonded where they are joined.
- The systems must be grounded to the building grounding system with a minimum 6 AWG copper conductor. Refer to Section 11.0 for specific Grounding and Bonding requirements.
- Use insulated metallic bushings for attached metallic conduits. Ground and bond the conduits to the tray (Figure A at the end of this document).
- The tray shall be ladder or wire basket style.
- Ladder-style tray must not be center hung.
- The wire basket-style tray shall be U shaped and constructed of round wire mesh. The basket tray shall be installed trapeze-style or wall-mounted. It must not be center hung.
- End-of-tray cable waterfalls must be used where wire drops down to prevent abrasions and cuts from metal tray edges.
- The tray must be no closer than 6 inches from the structural ceiling, ducts, pipes, or any other possible obstructions. A minimum separation of 5 inches from lighting, especially fluorescent lighting, is required.
- The tray must maintain 18-inch clearance from sprinkler heads.

- Compliance to this standard requires that the end of rigid or flex conduit must:
 - Have a bushing
 - Lie within the side and end planes of the cable tray
 - Lie within the tolerated distance as illustrated (Figure B)
 - Be anchored to a rigid support

13.0 SYSTEM DOCUMENTATION

The following section describes the installation, administration, testing, and as-built documentation required to be produced and/or maintained by the Contractor during the course of the installation.

13.1 CABLING SYSTEM LABELING

The contractor shall develop and submit for approval a labeling system for the cable installation. Appalachian State University will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cabling system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. All label printing will be machine generated using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet labels will be the manufacturer's labels provided with the outlet assembly.

13.2 AS-BUILT DRAWINGS

The Contractor shall provide a detailed as-built drawing to the Owner at the conclusion of the project. The marked-up drawing set will accurately depict the as-built status of the system including termination locations, cable routing, and all administration labeling for the cabling system. In addition, a narrative will be provided that describes any areas of difficulty encountered during the installation that could potentially cause problems to the telecommunications system.

13.3 TEST DOCUMENTATION

Test documentation shall be provided in pdf electronic format within three weeks after the completion of the project. Test documentation shall include scanner test results (Enhanced Category 5 or Category 6), fiber optic attenuation test results, and OTDR traces (if any). Test data within each section shall be presented in the sequence listed in the administration records. The test equipment name, manufacturer, model number and last calibration date will also be provided at the end of the document. The test document shall detail the test method used and the specific settings of the equipment during the test.

14.0 WARRANTY AND SERVICES

The Contractor shall provide a system warranty covering the installed cabling system against defects in workmanship, components, and performance, and covering follow-on support after project completion.

14.1 CABLING SYSTEM WARRANTY

The Contractor shall facilitate a 25-year CommScope Uniprise system performance warranty or industry equivalent between the Manufacturer and the Owner. An extended system performance warranty shall be provided which warrants functionality of all components used in the system for 25 years from the date of acceptance. The system performance warranty shall warrant the installed 250 MHz horizontal copper, and both the horizontal and the backbone optical fiber portions of the cabling system. Copper links shall be warranted to the link performance minimum expected results defined in TIA-568-C. Fiber optic links shall be warranted to the link and segment performance minimum expected results defined in TIA-568-C.

14.2 POST INSTALLATION MAINTENANCE

The Contractor shall furnish an hourly rate with the proposal submittal which shall be valid for a period of one year from the date of acceptance.

This rate will be used when cabling support is required to affect moves, additions, and changes (MACs) to the system. MACs shall not void the Contractor's nor Manufacturer's warranty.

14.3 PROJECT MANAGEMENT / GENERAL

The contractor shall establish a point of contact with Appalachian State University who will be responsible for reporting progress and updating Appalachian State University's Technical

Representatives, (Facilities Project Manager, ITS Application Services, ITS Network Services) with issues that Appalachian State University must address to facilitate the cabling system installation. Requests for access to limited access or restricted areas shall be made no later than *the day prior to the required access*.

The contractor shall maintain Appalachian State University's facility in a neat and orderly manner during the installation of the communications cabling system. Appalachian State University's facilities shall be maintained in broom clean condition at the completion of work each day. At the completion of work in each area, the contractor will perform a final cleaning of debris prior to moving the installation crew to the next work area.

15.0 CABLING SYSTEM ACCEPTANCE

The Customer's technical representative will make periodic inspection of the project in progress. One inspection will be performed at the conclusion of cable pulling, prior to closing of the false ceiling, to inspect the method of cable routing and support, and the firestopping of penetrations. A second inspection will be performed at completion of cable termination to validate that cables were dressed and terminated in accordance with ANSI/TIA specifications for jacket removal and pair untwist, compliance with Manufacturer's minimum bend radius, and that cable ends are dressed neatly and orderly.

15.1 FINAL INSPECTION

Upon completion of the project, the Customer's technical representative will perform a final inspection of the installed cabling system with the Contractor's project foreman. The final inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the aesthetic expectations of the Customer.

15.2 TEST VERIFICATION

Upon receipt of the test documentation, the Customer reserves the right to perform spot testing of a representative sample of the cabling system to validate test results provided in the test document. Customer testing will use the same method employed by the Contractor, and minor variations will be allowed to account for differences in test equipment and test variability. If significant discrepancies are found, the Contractor will be notified for resolution.

15.3 SYSTEM PERFORMANCE

During the three-week period between final inspection and delivery of the test and as-built documentation, the Customer will activate the cabling system. The Customer will validate operation of the cabling system during this period.

15.4 FINAL ACCEPTANCE

Completion of the installation, in-progress and final inspections, receipt of the test, receipt of the asbuilt documentation, and successful performance of the system for a three-week period will constitute acceptance of the system.

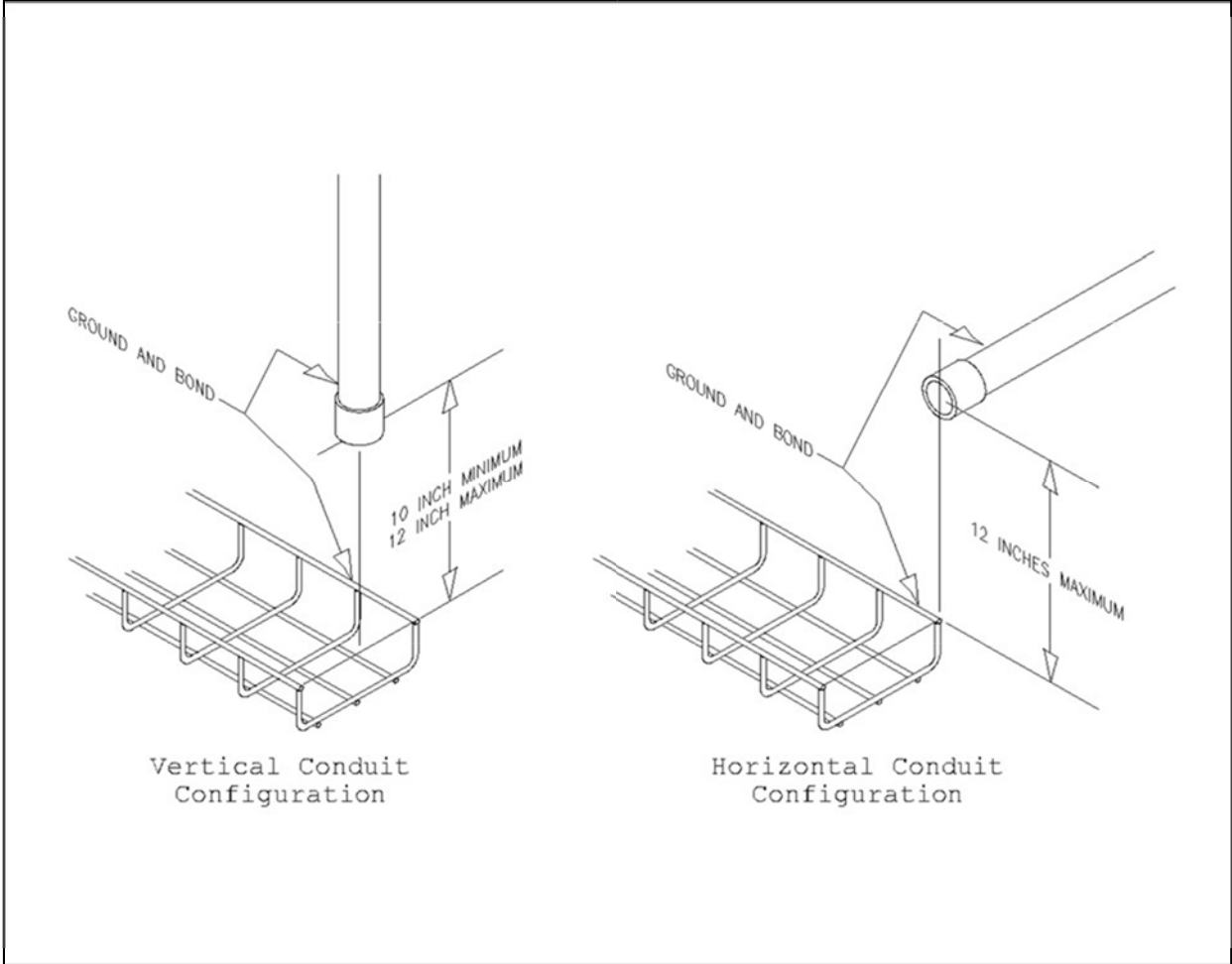


Figure A: Conduit to Cable Tray Configurations

1 NCBC Compliance: Fire Alarm notification appliances shall comply with NC Building Code and NC
2 Accessibility Code criteria for intensity and placement.

3
4 FM Compliance: Provide fire alarm systems and accessories which are FM approved.
5
6

7 **SUBMITTALS**
8

9 Submittals shall be made in strict accordance with the requirements of Section 019913. Specific submittal
10 requirements are defined in each section of this Division.

11
12 Product Data: Submit Manufacturer's technical product data, including specifications and installation
13 instructions, for each type of fire alarm system equipment. Submit technical product data on the fire alarm
14 service equipment. Submittals shall provide mA draw for each device submitted and UL listed minimum
15 voltage required to operate. Panel submittal shall list voltage drop allowed for panel and for individual NAC
16 circuits.
17

18 Shop Drawings: Submit shop drawings showing equipment, device identification numbers and locations,
19 and connecting wiring of entire fire alarm system. Include wiring and riser diagrams. Wiring diagrams shall
20 be based on the project floor plans, with devices and proposed conduit routing shown. Provide conductor
21 composition for each conduit section. Provide distance and route for each NAC (Notification Appliance
22 Circuit). Risers diagrams shall show consecutive connections for all devices with addresses and ratings.
23 Copies of Project Construction Documents or details therefrom may not be a part of the shop drawing
24 submittal. Shop drawings shall be prepared in an electronic format that is convertible to DXF files. The fire
25 alarm contractor shall submit complete shop drawings to the engineer for review prior to installation.
26

27 Wiring and Cabling: Submit wire and cable for signal circuits and notification circuits.
28

29 Installation Instructions: Submit Manufacturer's detailed installation instruction for all duct mounted smoke
30 detectors, flow switches, tamper switches, supervisory switches, and similar items which require mechanical
31 installation.
32

33 Battery Calculations: Provide battery calculations used to size secondary power source. Calculations must
34 be submitted prior to installation of equipment. Battery calculations shall utilize the UL 1971 RMS DC or full
35 wave rectified (FWR) current values of notification appliances, as appropriate for the power supply used,
36 provided by the product manufacturer. These values shall be highlighted in the submittal for each appliance
37 used in the project. Identify notification appliance circuit (NAC) current draws and calculate voltage drops
38 for each circuit in the submittal package. Identify EOL voltage for each proposed NAC, based on a source
39 voltage of 20.4 volts. In no case shall the calculated EOL for any NAC be below the minimum listed
40 operating voltage for the devices used.
41

42 Device List: Submit a listing for each addressable device that indicates the device address, function and
43 location. This information shall be the basis for the device descriptions to be programmed into the system,
44 contingent upon approval of Designer and Owner. Information shall be included in device identification that
45 is observed at the FACP and FAAP. Device addresses shall exactly match the information provided on the
46 shop drawings.
47

48 Maintenance Data: Submit maintenance data and parts lists for each type of fire alarm equipment installed,
49 including furnished specialties and accessories. Include this data, product data, and shop drawings in
50 maintenance manual.
51

52 Certifications: Submit a certification from the major equipment manufacturer indicating that the proposed
53 supervisor of installation and the proposed performer of contract maintenance is an authorized
54 representative of the major equipment manufacturer. Include names and addresses, and telephone
55 numbers in the certification.
56
57
58
59
60
61

PART 2 - PRODUCTS

ANCILLARY EQUIPMENT

ALARM APPLIANCES

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

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

Programming: Electronic Sounders shall provide the ANSI S3.41 three-pulse temporal pattern audible evacuation signal, described in NFPA 72, with an output sound level of at least 90 dBA measured at 10 feet from the device. Output sound level shall be 120 dB maximum. Electronic Sounders shall be field programmable without the use of special tools.

Mounting: Provide flush mounting devices suitable for mounting in a standard single gang device box unless otherwise indicated on the Drawings. Unless otherwise indicated on the Drawings, electronic sounders shall be mounted at 6'-8" (2.05 M) Above Finished Floor (AFF) or 6" (15.3 Cm) Below Finished Ceiling (BFC), whichever is lower.

Strobe Lights shall be located as shown on the Drawings. Strobe lights indicated for use exterior to the building shall be mounted at the indicated elevation and listed for use in wet locations. Strobe lights shall operate with synchronized flash output and have the following specifications:

Voltage: Strobe lights shall operate on 24 VDC nominal.

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

Mounting: Provide flush mounting devices suitable for mounting in a standard single gang device box unless otherwise indicated on the Drawings. Unless otherwise indicated on the Drawings, strobe lights shall be mounted with the lower edge of the visual element at 6'-8" (2.05 M) Above Finished Floor (AFF) or 6" (15.3 Cm) Below Finished Ceiling (BFC), whichever is lower.

Strobe intensity and flash rate: Must meet minimum requirements of UL 1971. Provide strobe lights with minimum intensity Candela (Cd) rating of 15 Cd, or greater if such is indicated adjacent to the device symbol on the Drawings.

Audible/Visual Combination Devices shall be located as shown on the Drawings and shall comply with all applicable requirements for both Audible Device and Strobe Lights. Unless otherwise indicated on the Drawings, combination A/V devices shall be mounted with the lower edge of the visual element at 6'-8" (2.05 M) Above Finished Floor (AFF) or 6" (15.3 Cm) Below Finished Ceiling (BFC), whichever is lower.

INITIATING DEVICES

Addressable Devices - General: Unless otherwise indicated on the Drawings all initiating devices shall be individually addressable. Addressable devices shall comply with the following requirements:

Address Setting: Addressable devices shall provide an address-setting means that use rotary decimal switches configured to provide decade (numbered 1 to 10) type addresses. Devices which use a binary address setting method, such as a dip switch, are not acceptable.

Connections: Addressable devices shall be connected to a Signaling Line Circuit (SLC) with two (2) wires. Signaling Line Circuits shall originate as indicated on the Riser Diagram shown in the Drawings.

1 Operational Indications: Addressable initiation devices shall provide dual alarm and power LEDs. Both
2 LEDs shall flash under normal conditions, indicating that the device is operational and in regular
3 communication with the control panel. Both LEDs shall be placed into steady illumination by the FACP to
4 indicate that an alarm condition has been detected. The flashing mode operation of the detector LEDs shall
5 be optional through the system field program. An output connection shall also be provided in the device
6 base to connect an external remote alarm LED.

7
8 Intelligent Initiation Devices: All smoke detectors shall be the "intelligent" in that smoke detector sensitivity
9 shall be set through the FACP and shall be adjustable in the field through the field programming of the
10 system. Sensitivity shall be capable of being automatically adjusted by the FACP on a time-of-day basis.
11 Using software in the FACP, detectors shall be capable of automatically compensating for dust accumulation
12 and other slow environmental changes that may affect performance. The detectors shall be listed by UL as
13 meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.

14
15 Device mounting Base: Unless otherwise specified all detectors shall be ceiling-mount and shall include a
16 separate twist-lock base with tamper proof feature.

17
18 Sounder Base: Where indicated on the Drawings, provide bases with a built-in (local) sounder
19 rated at 85 dBA minimum. Configure sounder bases such that sounders are activated under
20 conditions as described or otherwise indicated on the Drawings.

21
22 Test Means: The detectors shall provide a test means whereby they will simulate an alarm condition and
23 report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a
24 magnetic switch) or initiated remotely on command from the control panel when in the "test" condition.

25
26 Device Identification: Detectors shall store an internal identifying type code that the control panel shall use
27 to identify the type of device. Device identifications shall be either ION, PHOTO, or THERMAL.

28
29 Addressable Pull Stations - General: Addressable pull stations shall, on command from the Control Panel, send data
30 to the panel representing the state of the manual switch. They shall use a key operated test-reset lock, and shall be
31 designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
32 Pull stations that employ a glass break rod are not acceptable.

33
34 All pull stations shall be dual-action, have a positive, visual indication of operation and utilize a key type
35 reset.

36
37 Construction: Pull stations shall be constructed of Lexan or other material suitable to the installation
38 environment with clearly visible operating instructions provided on the cover. The word FIRE shall appear on
39 the front of the stations in raised letters, 1.75 inches or larger. Stations shall be suitable for surface
40 mounting or semiflush mounting as shown on the plans. Unless otherwise indicated on the Drawings pull
41 stations shall be mounted at 42" Above Finished Floor.

42
43 Photoelectric Smoke Detectors: Photoelectric smoke detectors shall use the photoelectric (light-scattering) principal
44 to measure smoke density and shall, on command from the control panel, send data to the panel representing the
45 analog level of smoke density. Unless otherwise indicated on the Drawings all smoke detectors shall be photoelectric
46 type.

47
48 Ionization Smoke Detector: Ionization smoke detectors shall use the dual-chamber ionization principal to measure
49 products of combustion and shall, on command from the control panel, send data to the panel representing the
50 analog level of products of combustion. Ionization type smoke detectors are indicated on the Drawings by the
51 designation ION adjacent to the smoke detector symbol.

52
53 Thermal Detectors: Thermal Detectors shall be intelligent addressable devices rated at 135°F. (58° C.) and unless
54 otherwise indicated on the Drawings shall have a rate-of-rise element rated at 15° F. (9.4° C.) per minute. It shall
55 connect via two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 99 intelligent heat detectors may
56 connect to one SLC loop. Thermal detectors shall use an electronic sensor to measure thermal conditions caused by
57 a fire and shall, on command from the control panel, send data to the panel representing the analog level of such
58 thermal measurements.

59

1 Non-Rate of Rise Detectors: Where indicated on the Drawings provide thermal detectors with non-rate of
2 rise thermal elements. Non-rate of rise detectors are indicated by NRR adjacent to the thermal detector
3 symbol.

4
5 Specialized Element Temperature Ratings: Where indicated on the Drawings provide thermal detectors with
6 specialized element temperature ratings. Specialized element temperatures are indicated by a temperature
7 rating adjacent to the thermal detector symbol, e.g. 195°F.

8
9
10 **MISCELLANEOUS SYSTEM ITEMS**

11
12 Addressable Dry Contact Monitor Module: Addressable Monitor Modules shall be provided to connect one
13 supervised IDC zone (either Style D or Style B) of non-addressable Alarm Initiating Devices (any Normally Open
14 [N.O.] dry contact device) to one of the Fire Alarm Control Panel Signaling Line Circuit Loops. Monitor modules shall
15 be installed as required by the system configuration. All required monitor modules may not be shown on the
16 Drawings. Modules must be located in conditioned spaces unless they are tested, listed and marked for continuous
17 duty across the range of temperature and humidity levels expected at their installed location.

18
19 Indication of Operation: Module shall include an LED that shall flash under normal conditions, indicating that
20 the Monitor Module is operational and in regular communication with the control panel.

21
22 Mounting Requirements: Monitor Modules shall mount in a standard 4-inch square, 2-1/8" deep electrical
23 box. LED shall be clearly visible through light pipe in box cover.

24 Supervision: Unless specifically noted otherwise on the drawings provide one monitor module for each
25 sprinkler switch (tamper and flow) and one for each non-addressable detector.

26
27 Two Wire Detector Monitor Module: Addressable Monitor Modules shall be provided to connect one supervised IDC
28 zone, either Class A or B (Style D or Style B operation) of non-addressable 2- wire smoke detectors or alarm initiating
29 devices (any N.O. dry contact device) to one of the Fire Alarm Control Panel Signaling Line Circuit Loops. Monitor
30 modules shall be installed as required by the system configuration and be UL Listed to operate with the specific
31 smoke detectors in the IDC zone. All required monitor modules may not be shown on the Drawings. Modules must
32 be located in conditioned spaces unless they are tested, listed and marked for continuous duty across the range of
33 temperature and humidity levels expected at their installed location.

34
35 Indication of Operation: Module shall include an LED that shall flash under normal conditions, indicating that
36 the Monitor Module is operational and in regular communication with the control panel.

37
38 Mounting Requirements: Monitor Modules shall mount in a standard 4-inch square, 2-1/8" deep electrical
39 box. LED shall be clearly visible through light pipe in box cover.

40
41 Addressable Control Module: Addressable Control Modules shall be provided to supervise and control the operation
42 of one conventional Notification Appliance Circuit (NAC) of compatible, 24 VDC powered, polarized Audio/Visual
43 (A/V) Notification Appliances. For fan shutdown and other auxiliary control functions, the control module may be set
44 to operate as a dry contact relay. The control module shall provide address-setting means using decimal switches
45 and shall also store an internal identifying code that the control panel shall use to identify the type of device. An LED
46 shall be provided that shall flash under normal conditions, indicating that the control module is operational and is
47 in regular communication with the control panel. Modules must be located in conditioned spaces unless they are
48 tested, listed and marked for continuous duty across the range of temperature and humidity levels expected at their
49 installed location.

50
51 Indication of Operation: Module shall include an LED that shall flash under normal conditions, indicating that
52 the Control Module is operational and in regular communication with the control panel.

53
54 Mounting Requirements: Control Modules shall mount in a standard 4-inch square, 2-1/8" deep electrical
55 box. LED shall be clearly visible through light pipe in box cover.

56
57 Configuration: The control module NAC circuit may be wired for Style Z or Style Y (Class A/B) with up to 1
58 Amp of inductive A/V signal, or 2 Amps of resistive A/V signal operation, or as a dry contact (Form C) relay.
59 The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30
60 VDC. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure
61 that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

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

4
5 Test Switch: A magnetic test switch shall be provided to test the module without opening or shorting its NAC
6 wiring.

7
8 Isolator Module: Isolator Modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC
9 loop. The Isolator Module shall limit the number of modules or detectors that may be rendered inoperative by a short
10 circuit fault on the SLC Loop. Modules must be readily accessible (not above ceiling) and clearly labeled. Modules
11 must be located in conditioned spaces unless they are tested, listed and marked for continuous duty across the range
12 of temperature and humidity levels expected at their installed location. Modules shall be shown on shop drawings
13 and as-built drawings.

14
15 Indication of Operation: Module shall include an LED that shall flash under normal conditions, indicating that
16 the Isolator Module is operational and in regular communication with the control panel. The LED shall
17 illuminate steadily to indicate that a short circuit condition has been detected and isolated.

18
19 Operation: Isolator Modules shall operate such that if a wire-to-wire short occurs, the Isolator module shall
20 automatically open-circuit (disconnect) the SLC loop. When the short circuit condition is corrected, the
21 Isolator Module shall automatically reconnect the isolated section. The Isolator Module shall not require any
22 address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an
23 Isolator Module after its normal operation.

24
25 Mounting: The Isolator Module shall mount in a standard 4-inch square, 2-1/8" deep electrical box. LED
26 shall be clearly visible through light pipe in box cover.

27
28 Serially Connected LED Annunciator: Annunciator shall communicate with the fire alarm control panel *via* an EIA-485
29 communications loop (four-wire) and shall individually annunciate all zones in the system. System zones shall be as
30 indicated on the Drawings. Up to 10 annunciators may be connected to the EIA-485 communications loop.

31
32 Annunciator Indicators: The annunciator shall provide a red Alarm LED per zone, and a yellow Trouble LED
33 per zone. The annunciator shall also have an "ON-LINE" LED, local piezo sounder, local acknowledge/lamp
34 test switch, and custom zone/function identification labels. Annunciator switches may be used for System
35 control such as, Global Acknowledge, Global Signal Silence, and Global System Reset. All annunciator
36 switches and indicators shall be software programmable.

37
38 LCD Alphanumeric Display Annunciator: The Alphanumeric display annunciator shall be a supervised, remotely
39 located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English
40 text. The LCD annunciator shall display all alarm and trouble conditions in the system.

41
42 System Capacity: The system shall allow a minimum of four LCD annunciators. In addition to annunciation
43 functions, each LCD annunciator shall be capable of the following software programmed system functions:
44 Acknowledge, Signal Silence and Reset.

45
46 Connections: The annunciator shall connect to a two-wire EIA-485 interface. The two-wire connection shall
47 be capable operation at distances of 6,000 feet. Provide interface to fiber optic cable systems and/or
48 repeater units where such are indicated on the Drawings.

49
50 Remote Power Supply: Ancillary power supply used to power NAC circuits, sounder bases, door holds and similar
51 items shall operate on 120 VAC, 60 Hz and shall have a continuous rating adequate to power all equipment and
52 functions in full alarm continuously. All modules and drivers must be able to withstand prolonged short circuits in the
53 field wiring, either line-to-line or line-to-ground, without damage. The power supply shall provide a battery charger
54 using dual-rate charging techniques for fast battery recharge. The remote power supply shall be monitored by the
55 FACP. It shall not be installed above a ceiling or in a non-conditioned space.

56

1 Batteries: Shall be completely maintenance free, shall not require liquids, fluid level checks or refilling, and
2 shall not be capable of producing spills and/or leaks. Batteries shall be sealed gel-cell type with expected
3 life of 10 years. Battery voltage shall be as required by the power supply and related equipment. Battery
4 shall have sufficient capacity to power the fire alarm system for not less than 60 hours plus 5 minutes of
5 alarm upon a normal AC power failure. The connected load for NAC circuits shall not exceed 75% of rated
6 current output of the power supply.
7

8
9 **PART 3 - EXECUTION**

10
11
12 Fire and smoke detection and alarm systems shall comply with the following system requirements with regard to
13 operation and installation.

14
15 All equipment and components shall be installed in strict compliance with manufacturers' recommendations.
16 All equipment supplied must be specifically listed for its intended use and shall be installed in accordance
17 with any instructions including in its listing. Consult the manufacturer's installation manuals for all wiring
18 diagrams, schematics, physical equipment sizes, etc., before beginning system installation. Refer to the
19 Riser/Connection diagram for all specific system installation/termination/wiring data.
20

21 All system components shall be attached to walls and ceiling/floor assemblies and shall be held firmly in
22 place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be
23 adequate to support the required load. Adhesives are not permitted to mount fire alarm system components
24 to building surfaces or structure.
25

26 The system shall be new and furnished with a warranty (parts & labor) of at least one year from the date of final
27 inspection and acceptance by the Owner. Equipment, initiating devices, and alarm appliances shall be arranged as
28 described in the Drawings; annunciator zones shall be configured as described in the Drawings.
29

30 The system shall be equipped with the following protective devices to prevent damage or nuisance alarms by nearby
31 lightning strikes, stray currents, or voltage transients. The devices are to be provided by the fire alarm equipment
32 supplier:
33

34 On AC Input: Provide a 120 volt, 20 amp feed through branch circuit series connected surge protective
35 device (SPD) in dedicated enclosure. Install at panelboard and trim excess lead lengths. Wind small coil in
36 branch circuit phase conductor, within SPD enclosure, downstream of the SPD connection. Coil is to be
37 about 1" diameter, 5 to 10 turns, and tie-wrapped. Ditek DTK-120SRD series is a product meeting this
38 performance specification. Equivalent unit with UL 1449 listing by other supplier are acceptable.
39

40 On DC Circuits Extending Outside Building: Near the point of entry to or exit from each building, provide a
41 hybrid technology surge protection device on each leg. The filter shall consist of gas discharge tube (GDT)
42 technology paired with silicon avalanche diode (SAD) technology, clamping voltage between 30 and 40
43 Volts. Ditek DTK – 2MHLPB series is a product meeting this performance specification. Equivalent unit with
44 UL 497B listing by other supplier are acceptable. Devices shall not use only MOV active elements for
45 protection.
46

47 Both audible and visible alarm signals shall be provided. Visible signals must be the strobe (flash discharge) type,
48 with white or clear lens, and shall comply with current ADA requirements for intensity and placement.
49

50 If the system includes AHU shutdown or smoke removal startup, silencing the alarm (without resetting) must not
51 reverse the shutdown. A supervised "AHU Shutdown Defeat" switch must be provided in the FACP. The switch must
52 be labeled and its "Normal" position indicated. Provide supervised Hand-Off-Auto switch(es) at the FACP for any
53 building smoke control equipment (pressurization or exhaust fans). The switch must cause a system "trouble"
54 indication when it is placed in the off-normal ("shutdown defeated") position.
55

56 The coverage of each fire alarm zone as described in the Drawings shall be indicated on the FACP and any remote
57 annunciator. This may be accomplished by engraved labels, framed directories, and/or graphic displays. Label tape
58 or handwritten labels are not acceptable.
59

1 Systems are to be provided with a separate and independent source of emergency power. Switching to emergency
2 power during alarm shall not cause signal drop-out. Batteries must meet the appropriate NFPA capacity
3 requirements, with a 25% safety factor. This requirement is in effect even if generator power is supplied to the Fire
4 Alarm Control Panel.

5
6 Style 6 Circuits Required: Systems with one or more addressable sub-panels that (1) have an integral addressable
7 loop controller, or (2) monitor multiple non-addressable initiation zones, shall comply with the NFPA 72 requirements
8 for Style 6 circuits.

9
10 All wiring shall be color coded in accordance with the following scheme, which shall be maintained throughout the
11 system, without color change in any wire run:

12		
13	Signal Line Circuit cable	Red jacket with Red(+)/Black(-)
14	Alarm Indicating Appliance Circuits	Blue (+)/Black (-)
15	AHU Shutdown Circuits	Yellow (+)/Brown (-)
16	Initiation Circuits from Monitor Modules	Violet (+)/Gray (-)
17	Door Control Circuits	Orange
18	Elevator Capture Circuits	Brown
19		

20 There shall be NO splices in the system other than at terminals in panels, fire alarm terminal cabinets (FATC) and
21 devices. "Wire nuts," crimp splices, or insulation piercing type connectors are not acceptable. All terminal blocks
22 shall be mounted in enclosures. All terminal screws shall have pressure wire connectors of the self-lifting or box lug
23 type.

24
25 Permanent wire markers shall be used to identify all splices and terminations for each circuit. For splices within
26 FATC's, use markers or other means to indicate which conductors leads to the FACP.

27
28 In multistory buildings, all circuits leaving the riser on each floor shall feed through a labeled terminal block in an
29 FATC with hinged cover, located for convenient access as indicated on the drawings. All required splices shall be
30 made on termination blocks that are securely mounted in the cabinet. Wire markers and corresponding wiring legend
31 shall be arranged as indicated on FATC detail on Drawings.

32
33 All fire alarm system cables and conductors shall be installed in raceway, couplers, and connectors meeting the
34 performance of installation requirements of Section 260534, RACEWAYS. The minimum size for fire alarm system
35 raceway shall be 3/4" trade size.

36
37 The exterior of all junction boxes containing fire alarm conductors shall be painted red; box interiors shall not
38 be painted. Box covers for junction boxes containing fire alarm conductors shall be painted red on both
39 sides. All painting of junction boxes and junction box covers shall be accomplished prior to installation of the
40 boxes to avoid possible problems with overspray. Those boxes in finished areas are permitted to be painted
41 to match the finish color.

42
43 Box covers shall be labeled to indicate the circuit(s) or function of the conductors contained therein. Labels
44 shall be neatly applied black lettering on a clear background. Handwritten labels or labels made from
45 embossed tape are not acceptable.

46
47 Raceways that penetrate outside walls from conditioned space shall have an internal seal to prevent condensation
48 within the raceway as it enters the conditioned space.

49
50 Provide metal backboxes or plastic skirts as manufactured by the fire alarm manufacturer for devices installed in a
51 surface mounted application. Such boxes shall match device in size and color.

52
53 Wire shall be new AWG #14 minimum stranded copper, type THHN/THWN for Notification Appliance Circuits.
54 Addressable loop (signaling line) circuits shall be wired with type FPL/FPLR/FPLP fire alarm cable, AWG 18
55 minimum, low capacitance, twisted shielded copper pair. Cable shield drain wires are to be connected at each device
56 on the loop to maintain continuity, taped to insulate from ground, and terminated at the FACP. Acceptable cables
57 include Atlas 22-18-1-1STP, BSCC S1802s19 (same as EEC 7806LC), West Penn D975, D991 (AWG 16), D995
58 (AWG 14), or equal wire having capacitance of 30pf/ft maximum between conductors. The cable jacket color shall be
59 red, with red (+) and black (-) conductor insulation.

1 EXCEPTION #1: Unshielded cable, otherwise equal to the above, is permitted to be used where the manufacturer's
2 installation instructions unequivocally require, or state a preference for, the use of unshielded cable for all systems,
3 AWG #16 minimum.

4
5 EXCEPTION #2: In underground conduit, use Type TC or PLTC cable (PE insulated) to avoid problems from
6 moisture.

7
8 Detection or alarm circuits must not be included in raceways containing AC power or AC control wiring. Within the
9 FACP, any 120 VAC control wiring or other circuits with an externally supplied AC/DC voltage above the nominal 24
10 VDC system power must be properly separated from other circuits and the enclosure must have an appropriate
11 warning label to alert service personnel to the potential hazard.

12
13 Provide an engraved label in FACP identifying its 120 VAC power source. This label shall include panelboard
14 location, identification, and circuit number.

15
16 Branch circuit breakers serving fire alarm systems shall be physically protected from inadvertent contact using a
17 breaker handle lock. Load designation shall be clearly identified (typed) in the panel directory. Breakers shall be
18 further identified with a permanent red dot applied to the handle or other visible portion of the breaker. Do not cover
19 operable portions of the breaker or written information on the case in meeting this requirement.

20
21 All wiring shall be checked for grounds, opens, and shorts, prior to termination at panels and installation of detector
22 heads. The minimum resistance to ground or between any two conductors shall be ten megohms (10 MW), as
23 verified with a megger. Provide advance notice to the A-E of these tests.

24
25 All connections at the FACP must be made by the Manufacturer's authorized, factory trained representative (rather
26 than by the electrical contractor).

27
28 The system shall be electrically supervised for open or (+/-) ground fault conditions in SLC, alarm circuits, and control
29 circuits. Removal of any detection device, alarm appliance, plug-in relay, system module, or standby battery
30 connection shall also result in a trouble signal. Fire alarm signal shall override trouble signals, but any pre-alarm
31 trouble signal shall reappear when the panel is reset.

32
33 Spare Parts: Provide the following spare parts with the system, each individually packaged and labeled. For multi-
34 building projects, calculate separately for each building:

35		
36	Fuses	2 of each size used in the system
37	Manual Stations	2% of installed quantity
38	Addressble Control Modules	4% of installed quantity
39	Indoor Horns/Strobes	4% of installed quantity
40	Indoor Strobe-only Notification Appliances	4% of installed quantity
41	Monitor Modules (Addressable interface)	4% of installed quantity
42	Isolation Modules /Isolation Bases	4% of installed quantity
43	Addressable Heat Detectors, Bases	4% of installed quantity
44	Spot Smoke Detectors, Bases	6% of installed quantity
45		

46 Increase decimal quantities of spare parts to the next higher whole number. For example, if a system has
47 20 spot-type smoke detectors provide 2 spare detectors with bases.

48 49 50 **ALARM VERIFICATION FOR SMOKE DETECTORS**

51
52 Fire alarm systems with automatic drift compensation functions shall be programmed with this feature activated for all
53 spot-type detectors. Fire alarm systems equipped with alarm verification, shall not be programmed with the feature
54 activated unless it is determined necessary through system testing.

55
56 Alarm verification shall be by device, with timer and tally. The system shall provide a timer function that can be set
57 for a specific detector or input module.

58
59 The timer function shall delay alarm signal for a field-programmable time period. The control panel shall override the
60 alarm verification functions if a subsequent alarm is reported during the verification period.

1 The talley function shall be capable of monitoring the total quantity of verification cycles initiated at the panel. A
2 maximum verification count may be set in the field, ranging from 0-20. When the counter threshold is exceeded, a
3 trouble signal shall be generated to the FACP.

4
5 Alarms from other than spot type smoke detectors must not be delayed by Alarm Verification. Alarm Verification is
6 NOT to be applied to duct smoke detectors, nor to any software configured "cross-zoned" detection devices.

9 **REMOTE ALARM TRANSMISSION REQUIREMENTS**

10
11 Each system with automatic fire detection, or which monitors a sprinkler system shall be equipped with a NFPA 72
12 type, dual line, four channel minimum, Digital Alarm Communicator Transmitter (DACT) for transmission of its fire
13 alarm, supervisory, and trouble signals to a Listed central station. As a minimum, where applicable, the following
14 signals shall be transmitted.

15
16 Fire alarm

17 Fire alarm system AC power trouble (only if 120 VAC is interrupted for 8 hours)

18
19 The precedence of DACT / Proprietary alarm system transmission shall be as follows:

- 20
21 1. Fire
22 3. Supervisory
23 4. Trouble

24
25 The "trouble" signal must not be sent unless maintained for 60 seconds or more to avoid nuisance
26 transmissions due to alarm verification cycles. Do not report ac power fail unless outage exceeds 8 hours.

27 28 29 **SMOKE DETECTORS**

30
31 Detectors must be the plug-in type, each having a separate base, not a mounting ring, to facilitate replacement and
32 maintenance. The base shall have integral terminal strips for circuit connections, rather than wire pigtailed. Each
33 detector or detector base shall incorporate an LED to indicate alarm. When installed in a room, detectors shall be
34 oriented so their alarm light is visible from the nearest door to the corridor, unless Remote Alarm Indicator Light
35 (RAIL) equipped.

36
37 A smoke detector shall be mounted with in 15 feet horizontally of each piece of fire alarm control system equipment,
38 including transponders, sub-panels, and booster power supplies.

39
40 Spot type smoke detectors mounted within 12 feet of a walking surface shall have their built-in locking device
41 activated. Activate the locks after the system has passed the final inspection by the owner.

42
43 Spot type smoke detectors shall not be used where ceiling height exceeds 25 feet, due to the increased difficulty with
44 access for maintenance and the impact on device performance.

45
46 Activate automatic drift compensation feature for all spot type smoke detectors. Systems shall not have alarm
47 verification feature activated with drift compensation functions activated.

48
49 Set spot-type smoke detector sensitivity to normal/ medium, unless directed otherwise by the design engineer or
50 owner's representative. Make additional changes as directed during testing and certification of the system.

51
52 Unless suitably protected against dust, paint, etc., detectors shall not be installed until the final construction clean-up
53 has been completed. Covers supplied with smoke detectors do not provide adequate protection from heavy
54 construction activities and shall not be used in this manner. Contaminated detectors must be REPLACED by the
55 Contractor at no additional cost to the Owner.

56
57 Identification of individual detectors is required. These device numbers, which must also be shown on the shop
58 drawings, shall be permanently affixed to the detector base. Device labels may not be affixed to the device.
59 Identification labels must be printed labels with black lettering on a clear background. Handwritten labels or labels
60 made from embossed tape are not acceptable.

1 **FIRE ALARM SYSTEM INSTALLATION AND CONFIGURATION**

2
3 In addition to other requirements of these Specifications the fire alarm system must comply with the following:

4
5 The addressable fire alarm system shall be connected, programmed, and tested only by the Manufacturer or
6 by an authorized distributor who stocks a full compliment of spare parts for the system. Technicians
7 performing this service shall be trained and individually certified by the Manufacturer for the model of system
8 being installed. Copies of installer certification must be included with the Contractor's submittal.
9

10 The complete configuration data (site-specific programming) for the system must be permanently stored on a
11 USB drive or compact disc (CD) and archived by the manufacturer or authorized distributor. A USB drive
12 or compact disc (CD) copy of this data must be submitted to the A-E for transmission to the Owner when the
13 system is commissioned.
14

15 The Manufacturer or authorized distributor must maintain software version (VER) records on the system
16 installed. The system software shall be upgraded free of charge if a new VER is released for any reason
17 during the warranty period. For any new VER to correct problems, free upgrade shall apply during the entire
18 life of the system.
19

20 All addressable loop controller circuits (SLCs) must be NFPA 72 Style 6 ("Class A") and shall have a
21 minimum of 20% spare addresses for future use. "T-taps" from the loop are not permitted. To minimize the
22 impact of a wiring fault on the system, isolation modules must be provided as follows:
23

- 24 1. At the FACP, at each end of the loop.
- 25 2. At the mid-point of a loop with less than 20 devices or control points.
- 26 3. After each 20 devices/control points on any addressable circuit.
- 27 4. For each circuit extending outside the building.
- 28 5. At each terminal cabinet on loops serving multiple floors (each floor).

29
30 Notification Appliance Circuits (NACs) shall be NFPA 72 Style Y (Class B). The load connected to each
31 circuit must not exceed 80% of rated supply output. The coverage of each circuit shall not exceed 3 floors.
32 The NAC voltage drop during alarm shall not exceed 14% of the voltage measured across the batteries.
33 The contractor shall use power outage testing to verify proper installation.
34

35 Supervision required: The connection between individual addressable modules and their contact type
36 initiating device(s) must be supervised.
37

38 The Fire Alarm System shall have multiple access levels which permit the Owner's authorized personnel to
39 disable individual alarm inputs or normal system responses (outputs) for alarms without changing the
40 system's executive programming or affecting operation of the rest of the system. This must include the
41 ability to override selected alarm inputs or system responses to alarms without affecting the remaining
42 portions of the system. The owner shall be taught how to make these changes in the training program
43 provided.
44

45 Floor Plans with Device Numbers: A copy of the floor plans shall be provided in the control panel. A
46 separate sheet shall be provided for each floor. Plans shall be reduced in size from engineering plans in
47 order to fit on 11 x 14 sheets. All device addresses shall be clearly labeled on plans. Indicate locations of
48 all cabinets, modules and end of line resistors. Plans shall be bound in book form. Sheets shall be
49 laminated. Provide legend for symbols. Provide holder for plan book in panel or in a locked box adjacent to
50 panel keyed to match panel. Provide label for box and book.
51

52 In addition to the system tests and certification described elsewhere, the Manufacturer or authorized
53 distributor must 100% test all site-specific software functions for the system and provide a written test report
54 or detailed check list.
55
56
57
58
59
60

1 **SYSTEM DOCUMENTATION**

2
3 The contractor shall provide the A-E with three copies of the following:

- 4
5 1. As-built wiring and conduit layout diagrams, including wire color code and/or label numbers, and
6 showing all interconnections in the system.
7 2. Electronic circuit diagrams of all control panels, modules, annunciators, communications panels,
8 etc.
9 3. Technical literature on all major parts of the system, including control panels, batteries, detectors,
10 manual stations, alarm indicating appliances, power supplies, and remote alarm transmission
11 means.
12 4. Detailed maintenance requirements as recommended by the fire alarm manufacturer.
13

14 The contractor shall provide the A-E with one copy of the following:

- 15
16 1. All software required, both for the installed fire alarm system and for any personal computer (PC)
17 necessary to access the fire alarm system for trouble shooting, programming, modifications,
18 monitoring, de-bugging, or similar functions.
19 2. Complete documentation for all software for both the installed fire alarm system and for any
20 interface PC software necessary for system functions as described in (1) above.
21 3. Framed floor plans for installation at the FACP. Plans shall show all system devices with the
22 unique device identification numbers indicated adjacent to each device. The identification numbers
23 shall match those represented in the as-built drawings and those reported at the FACP and the
24 LCD annunciator.
25
26

27 **SYSTEM TESTING & CERTIFICATION**

28
29 Upon completion of the installation the Division 28 Contractor and the Manufacturer's authorized installer together
30 shall conduct a 100% performance test of each alarm initiating device that is added and/or modified as part of the
31 construction activity for proper response. In addition, a 10% test as defined in NFPA 72 shall be conducted for
32 system devices and circuits in the building that were not directly impacted by the specified work. The system shall
33 operate for 48 hours prior to start of test. The Division 28 Contractor shall be present for the full 100% test.
34

35 The Contractor's 100% Performance test shall consist of the following. Upon activation of each alarm initiating
36 device, verify effective operation of every alarm notification appliance and all other functions such as elevator
37 capture, control smoke doors/dampers, proper operations of HVAC systems, and pressurization fans. In addition,
38 verify proper annunciation of each activated device, including device identification number, type and location, at the
39 FACP and each remote annunciator. The FACP shall reset after testing of each alarm initiating device. The digital
40 communicator shall be on-line and tested for proper communication to the receiving station. Equivalent methods of
41 demonstrating proper operation of HVAC shutdown are acceptable for this test. All supervised circuits must also be
42 tested to verify proper supervision. (Control circuits and remote annunciation lines are among those required to be
43 supervised.)
44

45 All testing described above shall be repeated in the event that subsequent software or wiring modifications are
46 determined necessary to meet the requirements of the contract documents. Such re-testing shall be included as part
47 of the base bid and provided at no additional cost to the Owner.
48

49 The A-E must be given 7 days advance notice of the tests.

50
51 The contractor must submit the following test documentation:

- 52
53 1. Written verification that this system test (100% and 10%) was done with copy of print out generated
54 during test.
55 2. System status and programming report, including a system operation matrix showing the actual
56 FACP response for each initiating device. In addition, provide the measured sensitivity of each
57 smoke detector. (Generate on date of Designer Pre-Final).
58 3. NFPA 72-2013 "Record of Completion" form: Use this form to detail the system installation and to
59 certify that it was installed per code requirements.
60
61

- 1 4. Voltage table indicating voltage at battery and at the last device on each NAC circuit. Take
2 readings at the start of test and every 15 minutes during NAC test. Test shall be 30 minutes
3 minimum.
4

5 After completion of the Contractor's 100% performance test and submission of the above documentation, the
6 contractor will request in writing that the A-E set up a pre-final review.
7

8 If the initial inspection determines that the required 100% system test was not reasonably done, or if a reinspection of
9 the project is requested without the punch list being nearly completed, the Contractor *may* be required to reimburse
10 the Designer for inspection costs.
11

12 System Report: In addition to the shop drawing submittal the fire alarm system contractor shall provide the engineer
13 two bound copies of the following technical information, for transmittal to the owner:

- 14 1) As-Built wiring diagram showing all loop numbers and device addresses, plus terminal numbers where
15 they connect to control equipment.
16 2) Manufacturer's detailed maintenance requirements
17 3) Technical literature on all control equipment, isolation modules, power supplies, alarm/ supervisory
18 signal initiating devices, alarm notification appliances, relays, etc...
19 4) The as-built "calculations" sheet referenced elsewhere in this specification.
20

21 Electronic archive: Complete configuration data (site-specific programming) for the system must be stored on
22 electronic media and archived by the fire alarm system manufacturer or authorized distributor. A USB drive or
23 compact disc (CD) copy of this data shall be submitted to the engineer for transmission to the owner.
24
25

26 **INSPECTIONS**

27
28 Fire Alarm System Designer Pre-final Review: Upon completing the fire alarm system installation, and prior to
29 scheduling the Designer Pre-final review, the installation contractor must successfully conduct and complete a 100%
30 performance test of the entire fully functional system. All audio visual device tests shall be scheduled with the owner.
31

32 As part of the Designer Pre-final review the system will be inspected and functionally tested on a comprehensive
33 basis. Equipment intended for open area protection or releasing device service may be subjected to simulated or
34 actual test fires in accordance with ANSI/UL guideline and sound engineering practice, to verify proper response.
35

36 The Contractor shall provide two-way radios, equipment keys, as-built drawings, ladders, smoke products, meter and
37 other materials required to test the system. The test will be conducted entirely by the Contractor. Any deficiencies
38 shall be recorded and corrected. After the items have been corrected, the system shall be tested again in the
39 presence of the Engineer.
40

41 In the event of malfunctions or excessive nuisance alarms, the Contractor must take prompt corrective action. The
42 Owner may require a repeat of the Contractor's 100% system test, or other inspections. Continued improper
43 performance during the warranty period shall be cause to require the Contractor to remove and replace the system.
44

45 Test Report: Upon successful completion of the Performance Inspection and correction of all deficiencies, the
46 manufacturer's authorized representative shall issue a test report to the Engineer, detailing and certifying the test.
47

48 Final Inspection: At the Owner's request and after passing the pre-final review, the Division 28 Contractor and
49 Manufacturer's authorized installer will conduct a full system test in the presence of the Owner and the Designer.
50 Upon request, a copy of the final database software must be presented to the Owner on USB drive before this test.
51 The software shall be loaded from the drive into the system in the presence of the Owner and Engineer. See
52 requirements for pre-final test and conduct similarly.
53

54 System Acceptance: After successful completion of the Final Inspection and recommendation of the Engineer, the
55 system will be accepted by the Owner. At this time the warranty period begins. In the event of malfunctions or
56 excessive nuisance alarms, the Contractor must take prompt corrective action. The Owner may require a repeat of
57 the Contractor's 100% system test, or other inspections. Continued improper performance during the warranty period
58 shall be cause to require the Contractor to remove the system.
59
60

61 **END OF SECTION 283110**

SYSTEM RECORD OF COMPLETION

*This form is to be completed by the system installation contractor at the time of system acceptance and approval.
It shall be permitted to modify this form as needed to provide a more complete and/or clear record.*

Insert N/A in all unused lines.

Attach additional sheets, data, or calculations as necessary to provide a complete record.

Form Completion Date: _____ Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

Description of property: _____

Name of property representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

2. INSTALLATION, SERVICE, TESTING, AND MONITORING INFORMATION

Installation contractor: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Service organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Testing organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Effective date for test and inspection contract: _____

Monitoring organization: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Account number: _____ Phone line 1: _____ Phone line 2: _____

Means of transmission: _____

Entity to which alarms are retransmitted: _____ Phone: _____

3. DOCUMENTATION

On-site location of the required record documents and site-specific software: _____

4. DESCRIPTION OF SYSTEM OR SERVICE

This is a: New system Modification to existing system Permit number: _____

NFPA 72 edition: _____

4.1 Control Unit

Manufacturer: _____ Model number: _____

4.2 Software and Firmware

Firmware revision number: _____

4.3 Alarm Verification

This system does not incorporate alarm verification.

Number of devices subject to alarm verification: _____ Alarm verification set for _____ seconds

FIGURE 7.8.2(a) System Record of Completion. (SIG-FUN)

SYSTEM RECORD OF COMPLETION (continued)

5. SYSTEM POWER

5.1 Control Unit

5.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____
 Overcurrent protection: Type: _____ Amps: _____
 Branch circuit disconnecting means location: _____ Number: _____

5.1.2 Secondary Power

Type of secondary power: _____
 Location, if remote from the plant: _____
 Calculated capacity of secondary power to drive the system:
 In standby mode (hours): _____ In alarm mode (minutes): _____

5.2 Control Unit

- This system does not have power extender panels
- Power extender panels are listed on supplementary sheet A

6. CIRCUITS AND PATHWAYS

Pathway Type	Dual Media Pathway	Separate Pathway	Class	Survivability Level
Signaling Line				
Device Power				
Initiating Device				
Notification Appliance				
Other (specify):				

7. REMOTE ANNUNCIATORS

Type	Location

8. INITIATING DEVICES

Type	Quantity	Addressable or Conventional	Alarm or Supervisory	Sensing Technology
Manual Pull Stations				
Smoke Detectors				
Duct Smoke Detectors				
Heat Detectors				
Gas Detectors				
Waterflow Switches				
Tamper Switches				

FIGURE 7.8.2(a) Continued

SYSTEM RECORD OF COMPLETION *(continued)*

9. NOTIFICATION APPLIANCES

Type	Quantity	Description
Audible		
Visible		
Combination Audible and Visible		

10. SYSTEM CONTROL FUNCTIONS

Type	Quantity
Hold-Open Door Releasing Devices	
HVAC Shutdown	
Fire/Smoke Dampers	
Door Unlocking	
Elevator Recall	
Elevator Shunt Trip	

11. INTERCONNECTED SYSTEMS

- This system does not have interconnected systems.
- Interconnected systems are listed on supplementary sheet _____.

12. CERTIFICATION AND APPROVALS

12.1 System Installation Contractor

This system as specified herein has been installed according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____
 Organization: _____ Title: _____ Phone: _____

12.2 System Operational Test

This system as specified herein has tested according to all NFPA standards cited herein.

Signed: _____ Printed name: _____ Date: _____
 Organization: _____ Title: _____ Phone: _____

12.3 Acceptance Test

Date and time of acceptance test: _____

Installing contractor representative: _____

Testing contractor representative: _____

Property representative: _____

AHJ representative: _____

FIGURE 7.8.2(a) *Continued*

EMERGENCY COMMUNICATIONS SYSTEMS SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to emergency communications systems.

This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____
Address: _____

2. DESCRIPTION OF SYSTEM OR SERVICE

- Fire alarm with in-building fire emergency voice alarm communication system (EVAC)
- Mass notification system
- Combination system, with the following components:
- Fire alarm EVACS MNS Two-way, in-building, emergency communications system
- Other (specify): _____
- NFPA 72 edition: _____ Additional description of system(s): _____
- _____

2.1 In-Building Fire Emergency Voice Alarm Communications System

Manufacturer: _____ Model number: _____

Number of single voice alarm channels: _____ Number of multiple voice alarm channels: _____

Number of speakers: _____ Number of speaker circuits: _____

Location of amplification and sound processing equipment: _____

Location of paging microphone stations:

Location 1: _____

Location 2: _____

Location 3: _____

2.2 Mass Notification System

2.2.1 System Type:

- In-building MNS-combination
- In-building MNS Wide-area MNS Distributed recipient MNS
- Other (specify): _____

FIGURE 7.8.2(b) Emergency Communications System Supplementary Record of Completion. (SIG-FUN)

**EMERGENCY COMMUNICATIONS SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION (continued)**

2. DESCRIPTION OF SYSTEM OR SERVICE (continued)

2.2.2 System Features:

- Combination fire alarm/MNS MNS autonomous control unit Wide-area MNS to regional national alerting interface
 Local operating console (LOC) Distributed-recipient MNS (DRMNS) Wide-area MNS to DRMNS interface
 Wide-area MNS to high power speaker array (HPSA) interface In-building MNS to wide-area MNS interface
 Other (specify): _____

2.2.3 MNS Local Operating Consoles

Location 1: _____

Location 2: _____

Location 3: _____

2.2.4 High Power Speaker Arrays

Number of HPSA speaker initiation zones: _____

Location 1: _____

Location 2: _____

Location 3: _____

2.2.5 Mass Notification Devices

Combination fire alarm/MNS visual devices: _____ MNS-only visual devices: _____

Textual signs: _____ Other (describe): _____

Supervision class: _____

2.2.6 Special Hazard Notification

- This system does not have special suppression pre-discharge notification.
 MNS systems DO NOT override notification appliances required to provide special suppression pre-discharge notification.

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS

3.1 Telephone System

Number of telephone jacks installed: _____ Number of warden stations installed: _____

Number of telephone handsets stored on site: _____

Type of telephone system installed: Electrically powered Sound powered

3.2 Two-Way Radio Communications Enhancement System

Percentage of area covered by two-way radio service: Critical areas _____ % General building areas _____ %

Amplification component locations: _____

Inbound signal strength _____ dBm Outbound signal strength _____ dBm

Donor antenna isolation is _____ dB above the signal booster gain.

Radio frequencies covered: _____

Radio system monitor panel location: _____

FIGURE 7.8.2(b) *Continued*

**EMERGENCY COMMUNICATIONS SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION (continued)**

3. TWO-WAY EMERGENCY COMMUNICATIONS SYSTEMS (continued)

3.3 Area of Refuge (Area of Rescue Assistance) Emergency Communications Systems

Number of stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.4 Elevator Emergency Communications Systems

Number of elevators with stations: _____ Location of central control point: _____

Days and hours when central control point is attended: _____

Location of alternate control point: _____

Days and hours when alternate control point is attended: _____

3.5 Other Two-Way Communications System

Describe: _____

4. CONTROL FUNCTIONS

This system activates the following control functions specific to emergency communications systems:

Type	Quantity
Mass Notification Override of Alarm Signaling Systems or Appliances	

See Main System Record of Completion for additional information, certifications, and approvals.

FIGURE 7.8.2(b) Continued

POWER SYSTEMS SUPPLEMENTARY RECORD OF COMPLETION

This form is a supplement to the System Record of Completion. It includes systems and components specific to power systems that incorporate generators, UPS systems, remote battery systems, or other complex power systems. This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record. Insert N/A in all unused lines.

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____
Address: _____

2. SYSTEM POWER

2.1 Control Unit

2.1.1 Primary Power

Input voltage of control panel: _____ Control panel amps: _____
Overcurrent protection: Type: _____ Amps: _____
Location (of primary supply panelboard): _____
Disconnecting means location: _____

2.1.2 Engine-Driven Generator

Location of generator: _____
Location of fuel storage: _____ Type of fuel: _____

2.1.3 Uninterruptible Power System

Equipment powered by UPS system: _____
Location of UPS system: _____
Calculated capacity of UPS batteries to drive the system components connected to it:
In standby mode (hours): _____ In alarm mode (minutes): _____

2.1.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____
Calculated capacity of batteries to drive the system:
In standby mode (hours): _____ In alarm mode (minutes): _____

2.2 In-Building Fire Emergency Voice Alarm Communications System or Mass Notification System

2.2.1 Primary Power

Input voltage of EVACS or MNS panel: _____ EVACS or MNS panel amps: _____
Overcurrent protection: Type: _____ Amps: _____
Location (of primary supply panelboard): _____
Disconnecting means location: _____

FIGURE 7.8.2(c) Power Systems Supplementary Record of Completion. (SIG-FUN)

POWER SYSTEMS
SUPPLEMENTARY RECORD OF COMPLETION (continued)

2. SYSTEM POWER (continued)

2.2.2 Engine-Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.2.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.2.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3 Notification Appliance Power Extender Panels

This system does not have power extender panels.

2.3.1 Primary Power

Input voltage of power extender panel(s): _____ Power extender panel amps: _____

Overcurrent protection: Type: _____ Amps: _____

Location (of primary supply panelboard): _____

Disconnecting means location: _____

2.3.2 Engine Driven Generator

Location of generator: _____

Location of fuel storage: _____ Type of fuel: _____

2.3.3 Uninterruptible Power System

Equipment powered by UPS system: _____

Location of UPS system: _____

Calculated capacity of UPS batteries to drive the system components connected to it:

In standby mode (hours): _____ In alarm mode (minutes): _____

2.3.4 Batteries

Location: _____ Type: _____ Nominal voltage: _____ Amp/hour rating: _____

Calculated capacity of batteries to drive the system:

In standby mode (hours): _____ In alarm mode (minutes): _____

See Main System Record of Completion for additional information, certifications, and approvals.

FIGURE 7.8.2(c) Continued

INTERCONNECTED SYSTEMS SUPPLEMENTARY RECORD OF COMPLETION

*This form is a supplement to the System Record of Completion. It includes a list of types and locations of systems that are interconnected to the main system.
This form is to be completed by the system installation contractor at the time of system acceptance and approval. It shall be permitted to modify this form as needed to provide a more complete and/or clear record.
Insert N/A in all unused lines.*

Form Completion Date: _____ Number of Supplemental Pages Attached: _____

1. PROPERTY INFORMATION

Name of property: _____

Address: _____

2. INTERCONNECTED SYSTEMS

Description	Location	Purpose

See Main System Record of Completion for additional information, certifications, and approvals.

FIGURE 7.8.2(e) Interconnected Systems Supplementary Record of Completion. (SIG-FUN)

FORM OF PROPOSAL

Post Office Renovation

Contract: _____

Appalachian State University

Bidder: _____

SCO-ID #23-26971-01A

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 further declares that he and his subcontractors have fully complied with NCGS 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).

The Bidder proposes and agrees if this proposal is accepted to contract with the State of North Carolina through Appalachian State University 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 Post Office Renovations in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina, and ASU 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.

ALTERNATES:

Should any of the alternates as described in the contract documents be accepted, the amount written below shall be the amount to be "added to" or "deducted from" the base bid. (Strike out "Add" or "Deduct" as appropriate.)

Alternate No. 01 Wood Accent Ceiling

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 02 Flex Duct Connections

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 03 Radiant Heating Panels

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 04 Smart Lockers and Smart Mailboxes

(Add) *(Deduct)* _____ Dollars(\$)

Alternate No. 05 Preferred Brand (TZ) Smart Lockers and Smart Mailboxes

(Add) *(Deduct)* _____ Dollars(\$)

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.

Unit Price No. 1: Custom Graphic Wallcovering Unit Price (\$) _____ per Square Foot

ALLOWANCES

By submitting this signed Proposal, Bidder confirms that Allowances indicated in Section 01 21 00 have been included in the Base Bid indicated above.

PROJECT COMPLETION

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.

<p>Note: Bidders must always submit <u>with their bid</u> the Identification of Minority Business Participation Form listing all MB contractors, <u>vendors and suppliers</u> 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.</p>
--

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. 2 _____ Addendum No. 4 _____ Addendum No. 6 _____

APPALACHIAN STATE UNIVERSITY - AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

Affidavit of _____

(Name of Bidder)

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.

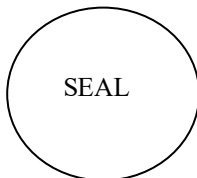
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure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



State of _____, County of _____

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

Notary Public _____

My commission expires _____

APPALACHIAN STATE UNIVERSITY --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

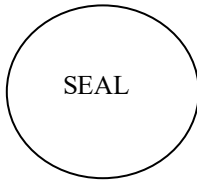
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

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: _____



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

APPALACHIAN STATE UNIVERSITY - 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 ID# _____ **(Project Name)**
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

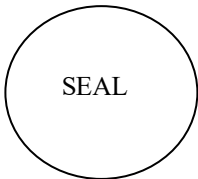
*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

** **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: _____

Title: _____

State of _____, County of _____

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

Notary Public _____

My commission expires _____

APPALACHIAN STATE UNIVERSITY 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:

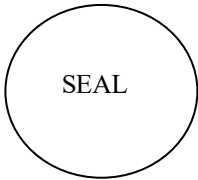
- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to 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.

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



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 Appalachian State University, 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 Appalachian State University, 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:

Consisting of the following sheets:

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 90 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 outlined 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:

(\$ _____).

Summary of Contract Award:

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 NCGS 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:

(Proprietorship or Partnership)

Contractor: (Trade or Corporate Name)

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 Post Office Renovation – Appalachian State University

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:

(Surety Corporate Seal)

(N.C. Licensed Resident Agent)

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 Post Office Renovation – Appalachian State University

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)

Witness:

Countersigned:

(N.C. Licensed Resident Agent)

Name and Address-Surety Agency

Surety Company Name and N.C.
Regional or Branch Office Address

Contractor: (Trade or Corporate Name)

By: _____

Title _____
(Owner, Partner, or Corp. Pres. or Vice
Pres. only)

(Surety Company)

By: _____

Title: _____
(Attorney in Fact)

(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