

Project Manual

New Building and Site Development for  
CDL Instructional Training Facility  
**Nash Community College**  
Parcel ID 345908, Eastern Avenue  
Rocky Mount, North Carolina 27804



PRE-BID DATE: Tuesday, September 26, 2023  
PRE-BID TIME: 3:00pm  
PRE-BID LOCATION: Room 8123  
Continuing Education Building  
Nash Community College

BID DATE: Tuesday, October 10, 2023  
BID TIME: 3:00pm  
BID LOCATION: Brown Auditorium  
Business and Industry Center Building  
Nash Community College



## BID SET

### Specification Book 1 of 2

August 2023

Architect's Project Number: 21056  
SCO ID: 22-24953-02A      NCCCS: 2657

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Oakley Collier Architects, PA  
109 Candlewood Road  
Rocky Mount, North Carolina 27804  
205 W Martin Street  
Raleigh, North Carolina 27601





**PROJECT PERSONNEL**

**PROJECT:** CDL Instructional Training Facility  
Nash Community College  
Parcel Id 345908, Eastern Avenue  
Rocky Mount, North Carolina, 27804

**PROJECT NO:** 21056

**DATE:** August 2023

**PRE-BID DATE:** Tuesday, September 19, 2023

**PRE-BID TIME:** 10:00am

**PRE-BID LOCATION:** Room 8123  
Continuing Education Building  
Nash Community College

**BID DATE:** Thursday, October 5, 2023

**BID TIME:** 3:00pm

**BID LOCATION:** Brown Auditorium  
Business and Industry Center Building  
Nash Community College

**OWNER:** Nash Community College  
522 N. Old Carriage Road  
Rocky Mount, North Carolina 27804

**ARCHITECT:** Oakley Collier Architects, P.A.  
109 Candlewood Road  
Rocky Mount, North Carolina 27804  
252-937-2500  
Firm License No. 50681

**CIVIL ENGINEER:** Stocks Engineering  
P.O. Box 1108  
Nashville, North Carolina 27856  
Firm License No. C-1874

**PME ENGINEER:** Atlantec Engineering, PA  
3221 Blue Ridge Rd #113  
Raleigh, North Carolina 27612  
Firm License No. C-961



### CERTIFICATION OF TECHNICAL SPECIFICATIONS

The following Technical Specifications found in this project manual were prepared by the Design Professional whose name and stamp appear below.

<u>Specification Section</u>	<u>Specification Title</u>
31 05 13	Soils for Earthwork
31 05 16	Aggregates for Earthwork
31 10 00	Site Clearing
31 22 13	Rough Grading
31 23 16	Excavation
31 23 17	Trenching
31 23 23	Fill
31 25 13	Erosion Controls
31 37 00	Riprap
32 11 23	Aggregate Base Courses
32 12 16	Asphalt Paving
32 13 13	Concrete Paving
32 17 23	Pavement Markings
32 31 13	Chain Link Fence and Gates
32 84 00	Planting Irrigation
32 91 13	Soil Preparation
32 91 19	Landscape Grading
32 92 19	Seeding
32 92 23	Sodding
32 93 00	Plants
33 05 13	Manholes and Structures
33 05 16	Utility Structures
33 05 17	Precast Concrete Valve Vaults and Meter Boxes
33 12 00	Water Utility Distribution
33 12 13	Water Service Connection
33 12 16	Water Utility Distribution Valves
33 12 19	Water Utility Distribution Fire Hydrants
33 13 00	Disinfection of Water Utility Distribution
33 31 00	Sanitary Utility Sewerage Piping
33 41 00	Storm Utility Drainage Piping
33 42 13	Pipe Culverts
33 46 00	Subdrainage

SCO ID: 22-24953-02A  
NCCCS: 2657

CDL Instructional Training Facility  
Nash Community College

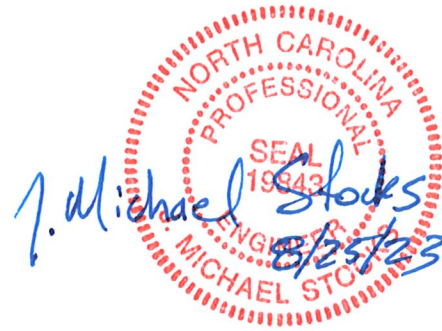
Full Name

Discipline

Seal

Firm Name: Stocks Engineering, PA    Engineering Discipline: Civil  
Firm License #: C-1874

Engineers Name: J. Michael Stocks  
PE License #: 19843  
Street Address: 801 E Washington Street  
City, State zip code: Nashville, NC 27856  
Phone: 252-459-8196  
E-mail: kvarnell@stocksengineering.com



### CERTIFICATION OF TECHNICAL SPECIFICATIONS

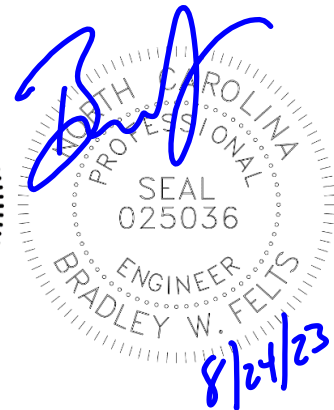
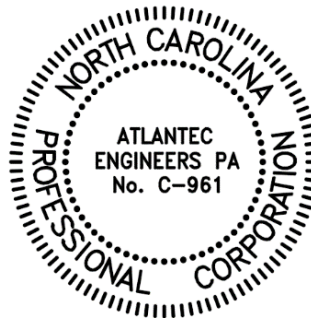
The following Technical Specifications found in this project manual were prepared by the Design Professional whose name and stamp appear below.

<u>Specification Section</u>	<u>Specification Title</u>
220500	Plumbing General Provisions
220513	Electrical Work in Plumbing Contract
220523	Plumbing Valves
220529	Plumbing Hangers and Supports
220553	Identification of Plumbing Components
220700	Plumbing Insulation
221000	Plumbing Pipe and Fittings
221119	Plumbing Piping Specialties
224000	Plumbing Fixtures

<u>Full Name</u>	<u>Discipline</u>	<u>Seal</u>
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Atlantec Engineers, PA Firm License #: C-961	Mechanical Engineer	
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Bradley W. Felts, PE  
PE License # 025036  
3221 Blue Ridge Road, Suite 113  
Raleigh, NC 27613  
Phone: 919-571-1111  
E-mail: [brad@atlantecengineers.com](mailto:brad@atlantecengineers.com)







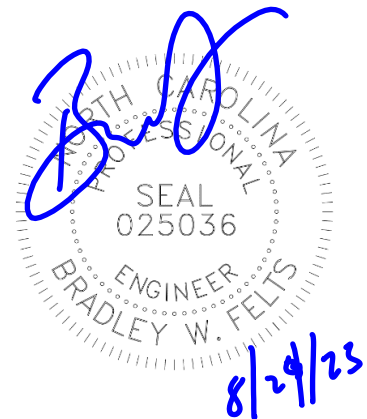
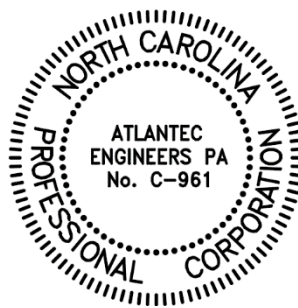
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<u>Specification Section</u>	<u>Specification Title</u>
23 05 00	GENERAL MECHANICAL REQUIREMENTS
23 05 13	ELECTRICAL WORK IN MECHANICAL CONTRACT
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23 34 00	FANS
23 37 00	AIR DISTRIBUTION
23 81 43	SPLIT SYSTEM HEAT PUMP
23 82 39	ELECTRIC UNIT HEATER

<u>Full Name</u>	<u>Discipline</u>	<u>Seal</u>
Atlantec Engineers, PA Firm License C-961	Mechanical Engineer	

Bradley W. Felts, PE  
PE License # 025036  
3221 Blue Ridge Rd. Suite 113  
Raleigh, NC 27612  
Phone: 919-571-1111  
E-mail: [brad@atlantecengineers.com](mailto:brad@atlantecengineers.com)





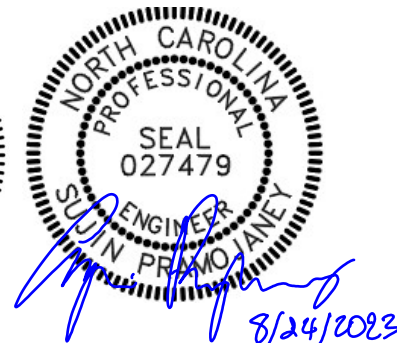
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<u>Specification Section</u>	<u>Specification Title</u>
26 00 00	GENERAL PROVISIONS (ELECTRICAL) CONTRACT
26 05 20	WIRES AND CABLES
26 05 33	BOXES AND CABINETS
26 05 45	CONDUIT AND CONDUIT FITTINGS
26 05 53	ELECTRICAL IDENTIFICATION
26 24 16	PANEL BOARDS AND CIRCUIT BREAKERS
26 27 26	WIRING DEVICES
26 27 27	DISCONNECTS
26 51 00	LIGHTING FIXTURES

<u>Full Name</u>	<u>Discipline</u>	<u>Seal</u>
Atlantec Engineers, P.A. Firm License # C-961	Electrical Engineering	

Sujin Pramojaney  
PE License # 027479  
3221 Blue Ridge Rd., Suite 113  
Raleigh, NC 27612  
Phone: 919-571-1111  
E-mail: [sujin@atlantecengineers.com](mailto:sujin@atlantecengineers.com)





## ADVERTISEMENT FOR BIDS

Pursuant to Section 143-129 of the General Statutes of North Carolina, sealed proposals endorsed "CDL Instructional Training Facility" will be received by Nash Community until 3:00pm on Tuesday, October 10, 2023, in the Brown Auditorium in the Business and Industry Center Building, Nash Community College, 522 N. Old Carriage Road, Rocky Mount, NC. (or mailed to the attention of Adrienne Covington, Nash Community College, P.O. Box 7488, Rocky Mount, NC 27804). Sealed proposal will immediately thereafter be publicly opened and read.

An open Pre-Bid Meeting will be held on Tuesday, 3:00pm on September 26, 2023, in Room 8123 in the Continuing Education Building, Nash Community College, 522 N. Old Carriage Road, Rocky Mount, NC. This meeting will address project specific questions, issues, bidding procedures and bid forms.

Complete plans and specifications for this project are available free of charge for a Digital Download or for \$350.00 (refundable) deposit by cash or certified check for hard copies. Either format can be obtained from Oakley Collier Architects, 109 Candlewood Road, Rocky Mount, NC 27804 (252.937.2500) beginning September 18, 2023, during normal office hours.

Owner: Nash Community College  
Attn: Adrienne Covington  
P.O. Box 7488  
522 N. Old Carriage Road  
Rocky Mount, NC 27804

Architect: Oakley Collier Architects, PA  
Attn: Jennifer Starkey  
109 Candlewood Road  
Rocky Mount, NC 27804

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

Signed: Nash Community College



## NOTICE TO BIDDERS

Sealed proposals will be received until 3:00pm on Thursday, October 10, 2023, in the Brown Auditorium in the Business and Industry Center Building, Nash Community College, 522 N. Old Carriage Road, Rocky Mount, NC. (or mailed to the attention of Adrienne Covington, Nash Community College, P.O. Box 7488, Rocky Mount, NC 27804). Sealed proposal will immediately thereafter be publicly opened and read for the furnishing of labor, material and equipment entering into the construction of the

CDL Instructional Training Facility  
Nash Community College

The Project includes the site development of a driving training course with ±3.7 acres of concrete and asphalt paving. The project also includes the construction of a 749 square foot support building which includes slab on grade, load bearing wood stud walls with brick veneer and fiber cement lap siding, asphalt shingle on wood trussed roof system. It also includes related plumbing, mechanical, and electrical systems.

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

### Pre-Bid Meeting

An open Pre-bid Meeting will be held at 10:00am on Tuesday, September 26, 2023, in Room 8123 in the Continuing Education Building, Nash Community College, 522 N. Old Carriage Road, Rocky Mount, NC. The meeting will address project specific questions, issues, bidding procedures and bid forms.

Complete plans, specifications and contract documents will be open for inspection in the offices of Oakley Collier Architects, P.A., 109 Candlewood Road, Rocky Mount, NC 27804 (252.937.2500), and in the plan rooms of the Carolinas Associated General Contractors, Raleigh, NC, in the local North Carolina offices of Dodge Data & Analytics, and in the Eastern Regional Office of Construction Market Data in Norcross, GA and in Minority Plan Rooms in the NC Institute of Minority Economic Development, Inc in Durham, NC and in East Coast Digital – Minority Plan Room Provider, Greenville, NC.

Complete plans and specifications for this project are available free of charge for a Digital Download or for \$350.00 (refundable) deposit by cash or certified check for hard copies. Either format can be obtained from Oakley Collier Architects, 109 Candlewood Road, Rocky Mount, NC 27804 (252.937.2500) [jstarkey@oakleycollier.com](mailto:jstarkey@oakleycollier.com)), beginning September 18, 2023, during normal office hours. Plans will also be available in the plan rooms of the Carolinas Associated General Contractors, Raleigh, NC, in the local North Carolina offices of Dodge Data & Analytics, and in the Construct Connect in Norcross, GA and in Minority Plan Rooms in the NC Institute of Minority Economic Development, Inc in Durham, NC and in East Coast Digital – Minority Plan Room Provider, Greenville, NC.

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 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 "Unlimited".

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 such bonds, conditioned that the surety will, upon demand forthwith make payment to the obligee upon said bond if the bidder fails 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 60 days.

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

Owner: Nash Community College  
Attn: Adrienne Covington  
P.O. Box 7488  
522 N. Old Carriage Road  
Rocky Mount, NC 27804

Architect: Oakley Collier Architects, PA  
Attn: Jennifer Starkey  
109 Candlewood Road  
Rocky Mount, NC 27804



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- 329223 – Sodding
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- 330516 – Utility Structures
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- 331216 – Water Utility Distribution Valves
- 331219 – Water Utility Distribution Fire Hydrants
- 331300 – Disinfection of Water Utility Distribution
- 333100 – Sanitary Utility Sewerage Piping
- 334100 – Storm Utility Drainage Piping
- 334213 – Pipe Culverts
- 334600 – Subdrainage



**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.

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## 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(1<sup>st</sup> tier subs), or their sub-subcontractors (2<sup>nd</sup> tier subs, 3<sup>rd</sup> 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 1<sup>st</sup> tier sub; 1<sup>st</sup> tier, 2<sup>nd</sup> tier, 3<sup>rd</sup> 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 INSTRUCTIONS TO BIDDERS  
AND GENERAL CONDITIONS OF THE CONTRACT**

**RELATION TO STANDARD FORMS**

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

**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

**SECTION 3: BULLETINS AND ADDENDA**

Add the following sentence to the beginning of the last paragraph in this section.

“Addenda may be issued up to seven (7) days immediately prior to the date established for the opening of bids.”

**SUPPLEMENTARY GENERAL CONDITIONS OF THE CONTRACT**

**ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA**

Add to Article 5, Paragraph "c" as follows:

“Refer to Specification Section - Submittal Procedures, for additional provisions on this subject.”

**ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE**

Add as subparagraph “C” to Article 6 as follows:

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

**ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC**

Add to Article 11, Paragraph "a", the following Subparagraphs 1 and 2:

“1. Public streets connecting to the project shall be protected from damage and debris in any form, and this protection shall be the responsibility of the Contractors.”

“2. Trash and debris shall be removed from the site daily or as often as necessary to maintain the property in a clean and safe condition.”

Add to Article 11, Paragraph "b", the following Subparagraph 1:

“1. Each Contractor shall provide adequate protection of work in place, existing buildings, and adjacent grounds while conducting various construction operations.”

Add to Article 11, Paragraph "d", the following Subparagraph 1:

“1. All materials and construction debris, etc., which is not to be used at the project site shall be disposed of off-site. The site has no landfill facilities.”

#### ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME

Change Article 23, Paragraph "b" to read:

“b. The contractor shall commence work to be performed under this agreement on a date to be specified in a written order from the Designer and shall complete all work hereunder within 180 consecutive calendar days of said date. For each day in excess of the above number of days, the Contractor(s) shall pay the Owner Five Hundred Dollars (\$500.00) as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the owner by reason of failure of said Contractor(s) to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.”

#### ARTICLE 31 - REQUESTS FOR PAYMENT

Change the second sentence of Paragraph "a" to read:

“The request shall be on the AIA Document G702 (latest edition), standard form for Application and Certificate for Payment supplemented by the Continuation sheet, AIA Document G703 (latest edition), and 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:”

#### ARTICLE 34 – MINIMUM INSURANCE REQUIREMENTS

Revise the second sentence of paragraph ‘c’ to read as follows:

“This insurance shall include the interests of the owner, the contractor, the subcontractors and subsubcontractors in the work and shall insure against *risks of direct physical loss – (all perils).*”

END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS  
AND GENERAL CONDITIONS





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

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

### **SECTION A: INTENT**

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

### **SECTION B: DEFINITIONS**

1. Minority - a person who is a citizen or lawful permanent resident of the United States and who is:
  - a. Black, that is, a person having origins in any of the black racial groups in Africa;
  - b. Hispanic, that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
  - c. Asian American, that is, a person having origins in any of the original peoples of the Far East, Southeast Asia and Asia, the Indian subcontinent, the Pacific Islands;
  - d. American Indian, that is, a person having origins in any of the original peoples of North America; or
  - e. Female
2. Minority Business - means a business:
  - a. In which at least fifty-one percent (51%) is owned by one or more minority persons, or in the case of a corporation, in which at least fifty-one percent (51%) of the stock is owned by one or more minority persons or socially and economically disadvantaged individuals; and
  - b. Of which the management and daily business operations are controlled by one or more of the minority persons or socially and economically disadvantaged individuals who own it.
3. Socially and economically disadvantaged individual - means the same as defined in 15 U.S.C. 637. "Socially disadvantaged individuals are those who have been subjected to racial or ethnic prejudice or cultural bias because of their identity as a member of a group without regard to their individual qualities". "Economically disadvantaged individuals are those socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities as compared to others in the same business area who are not socially disadvantaged".
4. Public Entity - means State and all public subdivisions and local governmental units.
5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.
6. Designer - Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering, work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.

8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

## **SECTION C: RESPONSIBILITIES**

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

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

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

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

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

2. State Construction Office

The State Construction Office will be responsible for the following:

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

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

### 3. Owner

Before awarding a contract, owner shall do the following:

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

### 4. Designer

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

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

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

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

5. Prime Contractor(s), CM at Risk, and Its First-Tier Subcontractors

Under the single-prime bidding, the separate-prime 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 State Construction Office and HUB Office, upon request.
- g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
- h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.
- i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), “MBE Documentation for Contract Payment” – (Appendix E), for designer’s review.
- j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor.

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

6. Minority Business Responsibilities

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

**SECTION 4: DISPUTE PROCEDURES**

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

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

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

## MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

### APPLICATION:

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

### MINORITY BUSINESS SUBCONTRACT GOALS:

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

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

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

**OR**

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

**OR**

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

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

## **MINIMUM COMPLIANCE REQUIREMENTS:**

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

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

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





**APPENDIX E**

**MBE DOCUMENTATION FOR CONTRACT PAYMENTS**

Prime Contractor/Architect: \_\_\_\_\_

Address & Phone: \_\_\_\_\_

Project Name: \_\_\_\_\_

SCO Project ID: \_\_\_\_\_

Pay Application #: \_\_\_\_\_ Period: \_\_\_\_\_

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

MBE FIRM NAME	* TYPE OF MBE	AMOUNT PAID THIS MONTH (With This Pay App)	TOTAL PAYMENTS TO DATE	TOTAL AMOUNT COMMITTED

\*Minority categories: Black (B), Hispanic (H), Asian American (AA), American Indian (AI), White Female (WF), Socially and Economically Disadvantaged (SED)

Approved/Certified By:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**SUBMIT WITH EACH PAY REQUEST - FINAL PAYMENT - FINAL REPORT**



# **Contractor Statement of Responsibility**

## **(Seismic-Force-Resisting System(s) or Wind-Force-Resisting System(s))**

\_\_\_\_ I acknowledge the special requirements contained in the quality assurance plan for the following seismic-force-resisting system(s) / wind-force-resisting system(s):

\_\_\_\_ I acknowledge that we will exercise control of above stated seismic-force-resisting system(s) / wind-force-resisting system(s) to obtain conformance with the construction documents approved by the building official. The methods for exercising control within our organization shall be as follows:

\_\_\_\_ I agree to submit a sample report of the seismic-force-resisting system(s) / wind-force-resisting system(s) for approval by the owner. Upon approval the owner shall determine the frequency and distribution.

\_\_\_\_ The following is a list a personnel and their title that will be responsible for exercising control on the above stated seismic-force-resisting system / wind-force-resisting system(s):

Signed \_\_\_\_\_  
Title:



**FORM OF SINGLE PRIME GENERAL CONTRACTOR PROPOSAL**

CDL Instructional Training Facility  
Nash Community College  
Architect's Project # 21056

Bidder: \_\_\_\_\_  
Date: \_\_\_\_\_

The undersigned, as Bidder, hereby declares that the only person or persons interested in the Proposal as principal of principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the contract to be entered into; that this proposal is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud. The Bidder further declares that he has examined the site of the Work and the Contract Documents relative thereto and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this proposal is accepted to contract with **Nash Community College** in the form of contract specified below, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary to complete the construction of **CDL Instructional Training Facility** in full in complete accordance with the plans, specifications and contract documents, to the full and entire satisfaction of the State of North Carolina, the **Nash Community College and Oakley Collier Architects, P.A.** with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and the contract documents, for the sum of:

**SINGLE PRIME CONTRACT:** \_\_\_\_\_

**BASE BID** \_\_\_\_\_

\_\_\_\_\_ Dollars (\$)

<b>Subcontractors:</b>	<b>License No.</b>	<b>Dollars (\$)</b>
------------------------	--------------------	---------------------

Site: \_\_\_\_\_

Plumbing: \_\_\_\_\_

Mechanical: \_\_\_\_\_

Electrical: \_\_\_\_\_

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.)

**GENERAL CONTRACT:**

**Alternate No. C-1: Asphalt Drive and Parking**

**(Add)(Deduct)** \_\_\_\_\_ **Dollars (\$)** \_\_\_\_\_

**Alternate No. C-2: Brick at Entrance Gate**

**(Add)(Deduct)** \_\_\_\_\_ **Dollars (\$)** \_\_\_\_\_

**Alternate No. C-3: Gravel Truck Parking**

**(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.

**GENERAL CONTRACT:**

Unit Price No. 1: Undercut/Fill in Trench Excavations (Unit) cu yd Unit Price (\$) \_\_\_\_\_

Cost for additional 250 cu yds included in Base Bid Price(\$) \_\_\_\_\_

Unit Price No. 2: Undercut/Fill in Open Excavations (Unit) cu yd Unit Price (\$) \_\_\_\_\_

Cost for additional 2000 cu yds included in Base Bid Price(\$) \_\_\_\_\_

Unit Price No. 3: Data Outlet and Conduit (Unit) each Unit Price (\$) \_\_\_\_\_

Cost for additional 4 occurrences included in Base Bid Price(\$) \_\_\_\_\_

Unit Price No. 4: Duplex Receptacle and Circuit (Unit) each Unit Price (\$) \_\_\_\_\_

Cost for additional 4 occurrences included in Base Bid Price(\$) \_\_\_\_\_

Unit Price No. 5: Septic Field Lines (Unit) In. ft. Unit Price (\$) \_\_\_\_\_

Cost for 500 linear feet included in Base Bid Price(\$) \_\_\_\_\_

Unit Price No. 6: Septic Pump Station (Unit) LS Unit Price (\$) \_\_\_\_\_

Cost for 1 occurrences included in Base Bid Price(\$) \_\_\_\_\_

The bidder further proposes and agrees hereby to commence work under this contract on a date to be specified in a written order of the designer and shall fully complete all work thereunder within the time

specified in the Supplementary General Conditions Article 23. Applicable liquidated damages amount is also stated in the Supplementary General Conditions Article 23.

### **MINORITY BUSINESS PARTICIPATION REQUIREMENTS**

*Provide with the bid* - Under GS 143-128.2(c) the undersigned bidder shall identify **on its bid** (Identification of Minority Business Participation Form) the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses. **Also** list the good faith efforts (Affidavit **A**) made to solicit minority participation in the bid effort.

**NOTE:** A contractor that performs all of the work with its own workforce may submit an Affidavit (**B**) to that effect in lieu of Affidavit (**A**) required above. The MB Participation Form must still be submitted even if there is zero participation.

*After the bid opening* - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then file within 72 hours of the notification of being the apparent lowest bidder, the following:

An Affidavit (**C**) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort and Affidavit **D** is not necessary;

**\* OR \***

If less than the 10% goal, Affidavit (**D**) of its good faith effort to meet the goal shall be provided. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

**Note:** Bidders must always submit **with their bid** the Identification of Minority Business Participation Form listing all MB contractors, vendors and suppliers that will be used. If there is no MB participation, then enter none or zero on the form. Affidavit A **or** Affidavit B, as applicable, also must be submitted with the bid. Failure to file a required affidavit or documentation with the bid or after being notified apparent low bidder is grounds for rejection of the bid.

**Proposal Signature Page**

The undersigned further agrees that in the case of failure on his part to execute the said contract and the bond within ten (10) consecutive calendar days after written notice being given on the award contract, the 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 check, cash or bid bond accompanying this proposal shall be returned to the undersigned.

Attach certified check, cash, or bid bond to this proposal.

Respectfully submitted this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_.

Name of firm or corporation making bid

\_\_\_\_\_

WITNESS: By: \_\_\_\_\_

\_\_\_\_\_  
Proprietorship or Partnership Title: \_\_\_\_\_  
(Owner, Partner, Pres., V. Pres.)

Address: \_\_\_\_\_

\_\_\_\_\_

License No: \_\_\_\_\_

Federal ID No: \_\_\_\_\_

(Corporate Seal)

ATTEST:

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. Only)

Addenda received and used in computing bid:

Addendum No. 1 \_\_\_\_\_ Addendum No. 3 \_\_\_\_\_

Addendum No. 2 \_\_\_\_\_ Addendum No. 4 \_\_\_\_\_



## Identification of HUB Certified/ Minority Business Participation

I, \_\_\_\_\_,  
 (Name of Bidder)

do hereby certify that on this project, we will use the following HUB Certified/ minority business as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work Type	*Minority Category	**HUB Certified (Y/N)

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

\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.

**The total value of minority business contracting will be (\$)\_\_\_\_\_.**



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

County of \_\_\_\_\_

(Name of Bidder)

Affidavit of \_\_\_\_\_

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

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

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

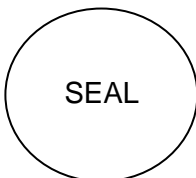
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure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

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

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_



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

County of \_\_\_\_\_

Affidavit of \_\_\_\_\_

(Name of Bidder)

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

\_\_\_\_\_ contract.

(Name of Project)

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

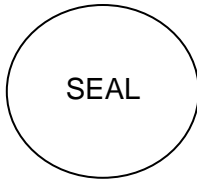
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

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

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_



# State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by HUB Certified/Minority Businesses

County of \_\_\_\_\_

**(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)**

If the portion of the work to be executed by HUB certified/minority businesses as defined in GS143-128.2(g) and 128.4(a),(b),(e) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit.  
 This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of \_\_\_\_\_ I do hereby certify that on the \_\_\_\_\_  
 (Name of Bidder)

\_\_\_\_\_ (Project Name)  
 Project ID# \_\_\_\_\_ Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below.

Attach additional sheets if required

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

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

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

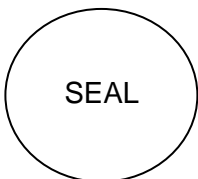
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



State of \_\_\_\_\_, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_

Notary Public \_\_\_\_\_

My commission expires \_\_\_\_\_





# State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of \_\_\_\_\_

**(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)**

If the goal of 10% participation by HUB Certified/ minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of \_\_\_\_\_ I do hereby certify that on the \_\_\_\_\_  
(Name of Bidder)

Project ID# \_\_\_\_\_ (Project Name) Amount of Bid \$ \_\_\_\_\_

I will expend a minimum of \_\_\_\_\_% of the total dollar amount of the contract with HUB certified/ minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	**HUB Certified Y/N	Work Description	Dollar Value

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

**\*\* HUB Certification with the state HUB Office required to be counted toward state participation goals.**

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

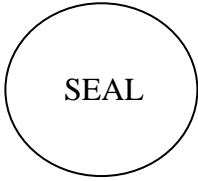
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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

Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_



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 Nash Community College through \_\_\_\_\_ as obligee, in the penal sum of \_\_\_\_\_ DOLLARS, lawful money of the United States of America, for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed, sealed and dated this \_\_\_\_ day of \_\_\_\_ 20\_\_

WHEREAS, the said principal is herewith submitting proposal for \_\_\_\_\_ and the principal desires to file this bid bond in lieu of making the cash deposit as required by G.S. 143-129.

NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION is such, that if the principal shall be awarded the contract for which the bid is submitted and shall execute the contract and give bond for the faithful performance thereof within ten days after the award of same to the principal, then this obligation shall be null and void; but if the principal fails to so execute such contract and give performance bond as required by G.S. 143-129, the surety shall, upon demand, forthwith pay to the obligee the amount set forth in the first paragraph hereof. Provided further, that the bid may be withdrawn as provided by G.S. 143-129.1

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)

\_\_\_\_\_(SEAL)



**FORM OF CONSTRUCTION CONTRACT**

(ALL PRIME CONTRACTS)

THIS AGREEMENT, made the \_\_\_\_\_ day of \_\_\_\_\_ in the year of 20\_\_ by and between \_\_\_\_\_

hereinafter called the Party of the First Part and the Trustees of Nash Community College 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 \_\_\_\_\_ 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:

\_\_\_\_\_  
Contractor: (Trade or Corporate Name)

\_\_\_\_\_  
(Proprietorship or Partnership)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Owner, Partner, or Corp. Pres. or Vice Pres. only)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. only)

Trustees of:

(CORPORATE SEAL)

\_\_\_\_\_  
(Agency, Department or Institution)

Witness:

\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_





**FORM OF PERFORMANCE BOND**

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_  
Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind, ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body, identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the contracting body, with or without notice to the surety, and during the life of any guaranty required under the contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness: \_\_\_\_\_

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec. only)

(Corporate Seal)

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)

**FORM OF PAYMENT BOND**

Date of Contract: \_\_\_\_\_

Date of Execution: \_\_\_\_\_

Name of Principal  
(Contractor) \_\_\_\_\_

Name of Surety: \_\_\_\_\_

Name of Contracting  
Body: \_\_\_\_\_

Amount of Bond: \_\_\_\_\_

Project \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that we, the principal and surety above named, are held and firmly bound unto the above named contracting body, hereinafter called the contracting body, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the principal entered into a certain contract with the contracting body identified as shown above and hereto attached:

NOW, THEREFORE, if the principal shall promptly make payment to all persons supplying labor/material in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Executed in \_\_\_\_\_ counterparts.

Witness:

\_\_\_\_\_  
(Proprietorship or Partnership)

Attest: (Corporation)

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Corp. Sec. or Asst. Sec.. only)

(Corporate Seal)

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



# CONTRACTOR EVALUATION



## PROJECT DATA

Name and Address of Contractor	Project Title and Location
Code and Item Number	State Construction Office ID Number
Owning Agency or University	Owner's Representative

## CHECK ONE

- This contractor is nominated for a contractor certificate of merit. A nomination letter to the State Building Commission is attached.
- This contractor has performed at an acceptable level.
- On a scale of 1-5 with 5 being the best. This contractor has performed at a level of less than 3. It is recommended that the State Construction Office convene a hearing per the procedures outlined in Section 322-A of the State Construction Manual. Documentation is attached

Name and Title of CPC	
Signature of CPC	Type of Report <input type="checkbox"/> Final <input type="checkbox"/> (Interim)
Date of Report	
Date Preliminary Report Sent to Contractor:	Date Final Report Sent to Contractor:





Raleigh – Geotech/CMT Lab 5400 Old Poole Road  
T 919.380.8750 Raleigh, NC 27610

January 11, 2023

Tim Oakley, AIA  
Oakley Collier Architects  
109 Candlewood Road  
Rocky Mount, NC 27804

Re: **Nash CC CDL Training Pad**  
Nash Community College  
3656 Eastern Avenue  
Rocky Mount, NC  
Pavement Design & Construction

As requested, this letter provides recommendations for the CDL training pad at the above-referenced address.

### **Project Understanding**

As we understand it, the subject site will be developed with a new paved pad for driver training. This will include training for tractor trailers, EMS and fire equipment, police cars, and even a helicopter landing area. The pad will be 310 feet x 370 feet, situated at the rear (north) of the property, and connected to Eastern Avenue by an 800± foot long paved driveway. Currently, the plans include asphalt pavement, but concrete paving may be considered as an alternative. Although no grading plans were available at the time of this report, the project's civil engineer estimated 4± feet of cut and fill to establish grade.

### **Subsurface Conditions**

The subsurface soils encountered at the boring locations consisted of native Coastal Plain soils. These soils encountered consisted of loose to medium dense SAND (SM and SC), stiff to hard lean CLAY (CL), and stiff to very stiff SILT (ML). These soils are part of the terrace deposits and upland sediment of the Atlantic Coastal Plain geologic province. It should be noted that the site is an active farm field and contains cultivated soil near the ground surface.

### **Site Grading**

#### Subgrade Preparation

All vegetation, topsoil, root mat, demolition debris, and any other unsatisfactory or deleterious materials should be removed from the limits of new construction. Such material should be considered unsuitable for reuse as structural fill. Although no excessive organic material was encountered in the borings, cultivated soils tend to be erratic in their composition and could contain pockets/areas of elevated organic content. If so encountered, its suitability should be evaluated for reuse and/or direct support of the proposed construction.

After stripping the site for areas at grade or needing fill, the exposed soils should be compacted with a large roller to densify and strengthen the near surface sands. We also recommend thoroughly compacting the exposed subgrade in areas of cut, after the finished subgrade elevation is reached.



All surfaces should be proofrolled prior to placing fill or beginning at-grade construction. Proofrolling should be performed with a tandem-axle dump truck weighing between 25 and 35 tons in the presence of Stewart so that recommendations can be provided for areas that rut, pump, or deflect excessively. Proofrolling should not be performed on frozen or excessively wet subgrades.

Proper site drainage should be maintained during earthwork operations. If not, the accumulation of water could result in construction delays. Common approaches to reduce wet weather delays include grading the area so that surface water flows away from the excavation, sealing exposed soil surface with a smooth-drum roller prior to precipitation events, and forming temporary ditches, swales, berms or other surface water diversion features. We also recommend limiting construction traffic during and after wet weather.

### Structural Fill

Whether imported or borrowed from an onsite source, structural fill should satisfy the following:

- No excessive deleterious material
- Organic content no greater than 3% (by weight)
- No rocks or other inclusions greater than 3 inches in diameter
- A maximum of 30% of the total material weight retained on the ¾-inch sieve
- Maximum Dry Density (MDD) of 95 pounds per cubic foot (pcf) or greater, as determined by the Standard Proctor Compaction Test (ASTM D698)
- Liquid Limit (LL) of 40 or less and a Plasticity Index (PI) of 20 or less, as determined by Atterberg Limits testing (ASTM D4318)

The near-surface SC and SM soils encountered onsite meet the LL/PI requirements above and are suitable for reuse as structural fill.

The water content of the structural fill should be maintained between -2% and +3% of the material's optimum water content as determined by the Standard Proctor Compaction Test (ASTM D698). Please note that soils can be deemed unusable due to water content but shall not be classified as unsuitable based solely on water content. When water content falls outside of the requirements set herein, the contractor shall be responsible for taking appropriate measures (drying or wetting) to render the soil usable unless otherwise agreed to by the Owner.

When using large, ride-on compactors, fill should be placed in loose lifts measuring 8 to 10-inch thick. Lift thicknesses should be thinned to 4 to 6 inches when using smaller, Rammax-type compactors and no more than 4 inches thick for sled and jumping-jack tampers. Structural fill should be compacted to the requirements below, which are based on the soil's maximum dry density as determined by ASTM D698 (standard Proctor):

- Within 12 inches of finished subgrade elevation ..... 98%
- Below 12 inches of finished subgrade elevation ..... 95%

It is recommended that the placement and compaction of structural fill be monitored by an engineering technician from Stewart to confirm that the contractor is meeting the project requirements. Field compaction testing should be performed in accordance with ASTM D1556 (Sand Cone Method), ASTM D2167 (Rubber Balloon Method), ASTM D2937 (Drive Cylinder Method), or ASTM D6938/D8167 (Nuclear Methods).





**Pavement**

Design

Based on the traffic assumptions below, the soil conditions encountered during our subsurface exploration, an estimated CBR of 6, and the site preparation recommendation herein, we recommend the minimum asphalt pavement section in the Table 1. The design provided is based on the standard 20-year design life and NCDOT/AASHTO design methodology.

Table 1: Flexible Pavement Section

Layer	Thickness, in.
Surface (S9.5C)	1.5
Intermediate Course (I19.0C)	4
Aggregate Base Course (ABC)	8

It is our understanding that a bid alternate will be requested to place concrete pavement for the pad in lieu of asphalt. As such, we recommend the minimum rigid pavement section shown in Table 2.

Table 2: Rigid Pavement Section

Layer	Thickness, in.
NCDOT "Pavement" Concrete*	8
Aggregate Base Course (ABC)	6
<i>*4,500 psi compressive strength &amp; 650 psi flexural strength (refer to Table 1000-1 of the NCDOT Standard Specifications)</i>	

Cracking of concrete is normal and should be expected. Proper jointing practices are paramount in the control of cracking, particularly their location and the time at which they are installed. Concrete pavements should be jointed according to ACI 330 Section 3.7. Joint reinforcing shall be sized and detailed by the project's civil engineer.

Construction

The pavement recommendations herein are predicated by the assumption that the subgrade soils are suitable for pavement support and have been properly moisture conditioned and compacted to a uniform and stable condition. Proofrolling must be performed on all pavement subgrades and observed by a qualified engineer or technician from Stewart to verify stability and check for weak spots. Proofrolling should also be performed after placement and compaction of the stone base.

Aggregate base course (ABC) stone should be compacted to at least 98 percent of its maximum dry density as determined by test method AASHTO T-180 (modified Proctor). Asphalt shall be placed with appropriate lift thicknesses and achieve the proper compaction for the mix(es) used, as specified in the latest edition of the NCDOT's QMS manual.



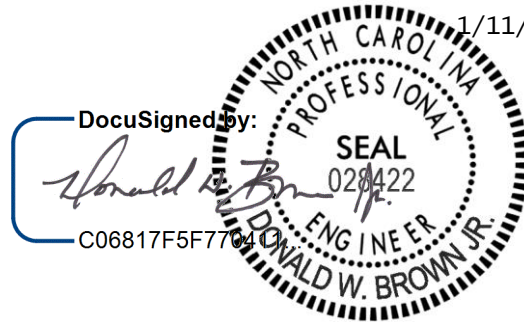
\* \* \* \* \*

We appreciate being of service on this project. If you have any questions, please feel free to contact me at your convenience.

**STEWART**

1/11/2023

DocuSigned by:  
*Heather Hancock*  
3409C94907FA477...



DocuSigned by:

*Donald W. Brown*

C06817F5F77040

Heather Hancock, EI  
Graduate Engineer, Geotechnical


Don Brown, PE, LEED AP  
Practice Leader | Geotechnical & Construction Services

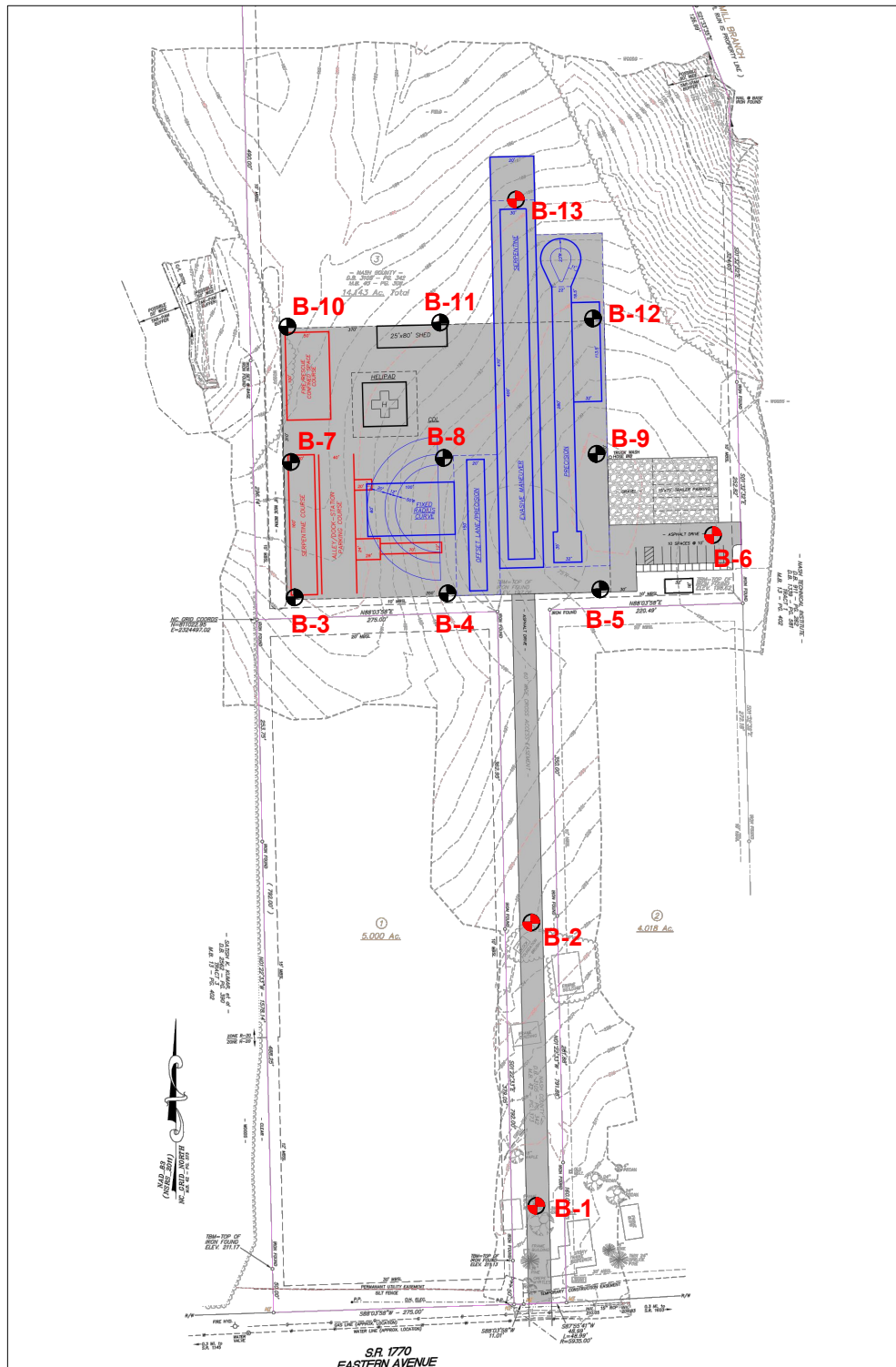
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attachments



Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.  
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 <b>STEWART</b> <small>5400 OLD POOLE RD        RALEIGH, NC 27610        T 919.380.8750</small>	<b>SITE VICINITY MAP</b> <b>NASH CC CDL TRAINING PAD</b> Eastern Avenue Rocky Mount, NC	Project No: F22040	Figure No.:
		Scale: NTS	<b>A1</b>
		Prepared By: HH	
		Date: 1-5-23	



Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.  
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**STEWART**  
 5400 OLD POOLE RD  
 RALEIGH, NC 27610  
 F 919.380.8750

FIRM LICENSE # C-1051  
 www.stewartinc.com

**BORING LOCATION DIAGRAM**  
**NASH CC CDL TRAINING PAD**  
 Eastern Avenue  
 Rocky Mount, NC

Project No:	F22040
Scale:	1 in = 200 ft
Prepared By:	HH
Date:	1-5-23

Figure No.:

**A2**



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-1

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 211 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 4.2 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								PL	WC
0.2		TOPSOIL	210.8						
0.2 - 3.0	SM	COASTAL PLAIN SOIL (NATIVE) MEDIUM DENSE, BROWN, WET, SILTY SAND			1 SS 1	4 4 6	10		
3.0 - 5.5	SC	MEDIUM DENSE, RED AND ORANGE, WET, CLAYEY SAND	208.0		2.5 SS 2	8 12 14	26		23
5.5 - 7.5	CL	HARD, RED, ORANGE AND GRAY, WET, SANDY LEAN CLAY WITH TRACE QUARTZ	205.5		5 SS 3	10 14 19	33		
BORING TERMINATED									

### BORING NO. B-2

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 202 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.8 ft  
 AFTER DRILLING: WL DRY CAVE-IN 5.3 ft  
 (24± HR)

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								PL	WC
0.2 - 3.0	SM	COASTAL PLAIN SOIL (NATIVE) MEDIUM DENSE, TAN-GRAY, WET, SILTY SAND			1 SS 1	3 5 6	11		
3.0 - 5.5		VERY STIFF TO HARD, RED, ORANGE AND GRAY, WET, SANDY LEAN CLAY	199.0		2.5 SS 2	7 7 11	18		
5.5 - 7.5	CL		196.7		5 SS 3	8 19 24	43		
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-3

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 190 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.8 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> VERY LOOSE, BROWN, WET, SILTY SAND	187.0		1 SS 1	1 2	3	PL	WC
5.0	SC	MEDIUM DENSE, RED, ORANGE AND GRAY, WET, CLAYEY SAND			3.5 SS 2	3 7 10	17		LL
7.5			182.5	183.2	6 SS 3	5 6 7	13		
BORING TERMINATED									

### BORING NO. B-4

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 195 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.6 ft  
 AFTER DRILLING: WL DRY CAVE-IN 5.4 ft  
 (24± HR)

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> VERY LOOSE, TAN-GRAY, WET, SILTY SAND	192.0		1 SS 1	1 2 1	3	PL	WC
5.5	CL	VERY STIFF, RED, ORANGE AND GRAY, WET, SANDY LEAN CLAY			3.5 SS 2	4 7 9	16		LL
7.5	SM	MEDIUM DENSE, TAN, WET, SILTY SAND	187.5	189.6 188.4	6 SS 3	5 8 10	18		
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-5

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 199 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 7.1 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, TAN-GRAY, WET, SILTY SAND	196.0		1 SS 1	2 3 4	7	PL	WC
5.0	ML	VERY STIFF, TAN, GRAY AND RED, WET, CLAYEY SANDY SILT			3.5 SS 2	5 7 10	17		LL
7.5			191.5	191.6	6 SS 3	7 8 10	18		
BORING TERMINATED									

### BORING NO. B-6

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 198 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.8 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, TAN-GRAY, WET, SILTY SAND	195.0		1 SS 1	2 2 4	6	PL	WC
5.0	SC	MEDIUM DENSE, TAN, WET, CLAYEY COARSE SAND			3.5 SS 2	3 5 6	11		LL
7.5	CL	STIFF, RED, TAN AND GRAY, WET, SANDY LEAN CLAY WITH TRACE QUARTZ	192.5		6 SS 3	5 5 8	14		
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-7

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 187 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 7 ft  
 AFTER DRILLING: WL DRY CAVE-IN 5.5 ft  
 (24± HR)

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, BROWN-GRAY, WET, SILTY SAND	184.0		1 SS 1	2 3	6	14	
4.5	SC	MEDIUM DENSE, BROWN-GRAY, WET, CLAYEY SAND	182.5		3.5 SS 2	3 7	18		
7.5	CL	VERY STIFF, TAN, RED AND GRAY, WET, SANDY SILTY LEAN CLAY	179.5	181.5 180	6 SS 3	5 8 9	17		
BORING TERMINATED									

### BORING NO. B-8

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 195 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.8 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	CL	<b>COASTAL PLAIN SOIL (NATIVE)</b> MEDIUM STIFF, BROWN AND ORANGE, WET, SANDY LEAN CLAY	192.0		1 SS 1	3 2 5	7	23	
6.5	SC	LOOSE, ORANGE, WET, CLAYEY SAND	188.5		3.5 BSA SS 2	4 3 6	9	26	
7.5	ML	STIFF, TAN AND RED, WET, CLAYEY SANDY SILT	187.5	189.2	6 SS 3	5 5 8	13		
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.





# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-9

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 200 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.7 ft  
 AFTER DRILLING: WL DRY CAVE-IN 4.8 ft  
 (24± HR)

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								PL	WC LL
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SC	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, BROWN AND ORANGE, WET, CLAYEY SAND	197.0		1 SS 1	3 3 4	7		
5.0	ML	STIFF TO VERY STIFF, ORANGE AND TAN, WET, SANDY SILT	195.2		2 SS 2	4 4 6	10		
6.5			193.3		3 SS 3	7 9 11	20		
7.5		BORING TERMINATED	192.5						

### BORING NO. B-10

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 185 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.9 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								PL	WC LL
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, BROWN-GRAY, WET, SILTY SAND	182.0		1 SS 1	2 2 2	4		
5.0	SM	MEDIUM DENSE, TAN, ORANGE AND GRAY, WET, SILTY SAND			2 SS 2	4 6 8	14		
6.5			177.5		3 SS 3	4 5 6	11		
7.5		BORING TERMINATED	178.1						

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

### BORING NO. B-11

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 190 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.5 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, BROWN AND GRAY, WET, SILTY SAND			1 SS 1	2 3 5	8	PL	WC
5.5	CL	VERY STIFF, GRAY AND ORANGE, WET, SANDY LEAN CLAY	187.0		3.5 SS 2	6 8 13	21		LL
7.5	SM	MEDIUM DENSE, RED, GRAY AND TAN, WET, SILTY SAND	184.5		6 SS 3	7 8 14	22		
BORING TERMINATED									

### BORING NO. B-12

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 196 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 7 ft  
 AFTER DRILLING: WL \_\_\_\_\_ CAVE-IN \_\_\_\_\_

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	CL	<b>COASTAL PLAIN SOIL (NATIVE)</b> SOFT, GRAY AND ORANGE, WET, SANDY LEAN CLAY			1 SS 1	2 3 1	4	PL	WC
7.5	ML	STIFF, ORANGE AND RED, WET, SANDY SILT	193.0		3.5 SS 2	3 5 9	14		LL
			188.5		6 SS 3	4 6 7	13		
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.



# BORING LOG

## STEWART

PROJECT NASH CC CDL TRAINING PAD  
 LOCATION ROCKY MOUNT, NC

CLIENT OAKLEY COLLIER  
 PROJECT NO. F22040.00

**BORING NO. B-13**

DATE DRILLED 12/27/22 LOGGED BY \_\_\_\_\_  
 DRILLING CONTRACTOR J&L DRILLING  
 DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)  
 DRILL RIG CME 550 HAMMER TYPE MANUAL

GROUND SURFACE EL. 189 ft BORING DEPTH 7.5 ft  
 TIME OF DRILLING: WL DRY CAVE-IN 6.1 ft  
 AFTER DRILLING: WL DRY CAVE-IN 4.9 ft  
 (24± HR)

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft) TYPE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF) ▲	
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
3.0	SM	<b>COASTAL PLAIN SOIL (NATIVE)</b> LOOSE, TAN-GRAY, WET, SILTY SAND	186.0		1 SS 1	1 1 3	4	PL	WC
5.0	CL	STIFF, RED, TAN AND GRAY, WET, SILTY LEAN CLAY	184.1		3.5 SS 2	3 5 7	12		LL
7.0			182.0		6 SS 3	4 7 8	15		
7.5	SM	MEDIUM DENSE, GRAY AND ORANGE, WET, SILTY SAND	181.5						
BORING TERMINATED									

Note: SPT Blow Counts are per 6 inches of penetration unless otherwise noted.

# UNIFIED SOIL CLASSIFICATION (ASTM D-2487)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND		
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS  >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	$Cu > 4$ AND $1 < Cc < 3$	GW	WELL-GRADED GRAVEL		
		GRAVELS WITH FINES >12% FINES	$Cu > 4$ AND $1 > Cc > 3$	GP	POORLY-GRADED GRAVEL		
		SANDS	CLEAN SANDS <5% FINES	$Cu > 6$ AND $1 < Cc < 3$	SW	WELL-GRADED SAND	
		SANDS AND FINES >12% FINES	$Cu > 6$ AND $1 > Cc > 3$	SP	POORLY-GRADED SAND		
	FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS  LIQUID LIMIT <50	INORGANIC	$PI > 7$ AND PLOTS > "A" LINE	CL	LOW PLASTICITY (LEAN) CLAY	
			ORGANIC	$PI > 4$ AND PLOTS < "A" LINE	ML	LOW PLASTICITY SILT	
		SILTS AND CLAYS  LIQUID LIMIT >50	INORGANIC	$LL$ (oven dried)/ $LL$ (not dried) <0.75	OL	ORGANIC CLAY OR SILT	
			ORGANIC	$PI$ PLOTS > "A" LINE	CH	HIGH PLASTICITY (FAT) CLAY	
		ORGANIC	$PI$ PLOTS < "A" LINE	MH	HIGH ELASTICITY SILT		
		ORGANIC	$LL$ (oven dried)/ $LL$ (not dried) <0.75	OH	ORGANIC CLAY OR SILT		
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT		

### MATERIAL TYPES ENCOUNTERED ONSITE

Lean Clay (CL)	Silt (ML)
Clayey Sand (SC)	Silty Sand (SM)
Topsoil / Organic Layer	

### PENETRATION RESISTANCE

(RECORDED AS BLOWS PER 6 IN.)

SAND & GRAVEL		SILT & CLAY	
DENSITY	BLOWS/FT*	CONSISTENCY	BLOWS/FT*
VERY LOOSE	0 - 3	VERY SOFT	0 - 1
LOOSE	4 - 9	SOFT	2 - 4
MEDIUM DENSE	10 - 30	MEDIUM STIFF (FIRM)	5 - 8
DENSE	31 - 50	STIFF	9 - 15
VERY DENSE	51+	VERY STIFF	16 - 30
		HARD	31+

\* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

### SAMPLE TYPES FOR THIS EXPLORATION

SPLIT SPOON

### ADDITIONAL ABBREVIATIONS, TERMINOLOGY, & SYMBOLS

HSA - HOLLOW-STEM AUGER	EOD - END OF DAY
HA - HAND AUGER	FIAD - FILLED IMMEDIATELY AFTER DRILLING/DIGGING
SPT - STANDARD PENETRATION TEST	DRY - REQUIRES WETTING TO REACH OPTIMUM
BPF - BLOWS PER FOOT	MOIST - AT OR NEAR OPTIMUM
PL - PLASTIC LIMIT	WET - REQUIRES DRYING TO REACH OPTIMUM
LL - LIQUID LIMIT	SAT - SATURATED, EXCESSIVELY WET (FREE WATER)
MC - MOISTURE CONTENT	WATER LEVEL AT TIME OF DRILLING
SS - SPLIT SPOON	WATER LEVEL AFTER DRILLING
AP - AUGER PROBE	CAVE-IN LEVEL
WL - WATER LEVEL	
USCS - UNIFIED SOIL CLASSIFICATION SYSTEM	
WOH - WEIGHT OF HAMMER	
WOR - WEIGHT OF RODS	

## **Index of Drawings**

### **GENERAL**

- G0.1 COVERSHEET
- G0.2 APPENDIX B

### **CIVIL**

- CE-00 COVER
- CE-01 DEMOLITION PLAN
- CE-02 SITE AND UTILITY PLANPLAN
- CE-03 WATER LINE PROFILE
- CE-04 GRADING & DRAINAGE PLAN
- CE-05 INITIAL EROSION CONTROL PLAN
- CE-06 FINAL EROSION CONTROL PLAN
- D-01 EROSION CONTROL NOTES/DETAILS
- D-02 EROSION CONTROL DETAILS
- D-03 SITE NOTES AND DETAILS
- D-04 SITE NOTES AND DETAILS
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- D-07 NPDES SHEET
- D-08 WET POND PLAN
- D-09 COLORED STRIPING PLAN

### **ARCHITECTURAL**

- A1.1 FOUNDATION & ROOF FRAMING PLAN
- A1.2 LIFE SAFETY, FLOOR PLAN, SCHEDULES, & DETAILS
- A1.3 REFLECTED CEILING & ROOF PLANS
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- A3.1 WALL SECTIONS & DETAILS
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- P1.1 PLUMBING PLAN
- P2.1 PLUMBING FIXTURE SCHEDULE AND RISER
- P3.1 PLUMBING NOTES, LEGEND, AND DETAILS

### **MECHANICAL**

- M1.1 MECHANICAL PLAN
- M2.1 MECHANICAL SCHEDULES, NOTES, AND DETAILS

### **ELECTRICAL**

- E1.1 POWER RISER DIAGRAM, POWER PLAN, PANEL SCHEDULE
- E1.2 SITE LIGHT PLAN
- E2.1 LEGEND, NOTES, FIXTURE SCHEDULE
- E2.2 DETAILS



**SECTION 01 10 00  
SUMMARY**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: CDL Instructional Training Facility for Nash Community College.
- B. Owner's Name: Nash Community College.
- C. Architect's Name: Oakley Collier Architects, PA.
- D. The Project includes the site development of a driving training course with approximately 3.7 acres of asphalt and concrete paving. The project also includes the construction of a 749 square foot support building which includes slab on grade, load bearing wood stud walls with brick veneer and fiber cement lap siding, asphalt shingle on wood trussed roof system. It also includes related plumbing, mechanical, and electrical systems.

**1.02 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a stipulated sum.

**1.03 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be supplied and installed by Others before Final Acceptance.
- B. Items noted OSOI (Owner Supplied Owner Installed) will be supplied and installed by the Owner.
- C. Items noted OSCI (Owner Supplied Contractor Installed) will be supplied by the Owner and installed by the Contractor:
- D. Items noted CSCI (Contractor Supplied Contractor Installed) will be supplied and installed by the Contractor.

**1.04 OWNER OCCUPANCY**

- A. Owner intends to occupy the Project upon Final Acceptance.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

**1.05 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings.
- B. Arrange use of site and premises to allow:
  - 1. Work by Others.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Utility Outages and Shutdown:
  - 1. Prevent accidental disruption of utility services to other facilities.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 01 20 00  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

**1.02 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- E. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification section. Identify site mobilization.
- F. Include in each line item, the amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.
- G. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.03 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit one electronic and three hard-copies of each Application for Payment.
- J. Include the following with the application:
  - 1. Transmittal letter as specified for submittals in Section 01 30 00.

2. Construction progress schedule, revised and current as specified in Section 01 30 00.
  3. Partial release of liens from major subcontractors and vendors.
  4. Affidavits attesting to off-site stored products.
- K. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

#### 1.04 MODIFICATION PROCEDURES

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 10 days.
- E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 6000.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
  2. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
- G. Substantiation of Costs: Provide full information required for evaluation.
1. On request, Provide following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
  2. Support each claim for additional costs with additional information:
    - a. Origin and date of claim.
    - b. Dates and times work was performed, and by whom.
    - c. Time records and wage rates paid.
    - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
  3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the

Contract Sum.

- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- K. Promptly enter changes in Project Record Documents.

**1.05 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01 70 00.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 01 22 00  
UNIT PRICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. List of unit prices, for use in preparing Bids.
- B. Measurement and payment criteria applicable to Work performed under a unit price payment method.
- C. Defect assessment and non-payment for rejected work.

**1.02 COSTS INCLUDED**

- A. Unit Prices included on the Bid Form shall include full compensation for all required labor, products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

**1.03 UNIT QUANTITIES SPECIFIED**

- A. Quantities indicated in the Bid Form are for bidding and contract purposes only. Quantities and measurements of actual Work will determine the payment amount.

**1.04 MEASUREMENT OF QUANTITIES**

- A. Measurement methods delineated in the individual specification sections complement the criteria of this section. In the event of conflict, the requirements of the individual specification section govern.
- B. Testing agency will take all measurements and compute quantities accordingly.
- C. Assist by providing necessary equipment, workers, and survey personnel as required.
- D. Measurement Devices:
  - 1. Weigh Scales: Inspected, tested and certified by the applicable state Weights and Measures department within the past year.
  - 2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.
  - 3. Metering Devices: Inspected, tested and certified by the applicable state department within the past year.
- E. Measurement by Weight: Concrete reinforcing steel, rolled or formed steel or other metal shapes will be measured by handbook weights. Welded assemblies will be measured by handbook or scale weight.
- F. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness.
- G. Measurement by Area: Measured by square dimension using mean length and width or radius.
- H. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord.
- I. Stipulated Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.
- J. Perform surveys required to determine quantities, including control surveys to establish measurement reference lines. Notify Architect prior to starting work.

**1.05 PAYMENT**

- A. Payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities of Work that is incorporated in or made necessary by the Work and accepted by the Architect, multiplied by the unit price.
- B. Payment will not be made for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from the transporting vehicle.
  - 4. Products placed beyond the lines and levels of the required Work.

5. Products remaining on hand after completion of the Work.
6. Loading, hauling, and disposing of rejected Products.

#### **1.06 DEFECT ASSESSMENT**

- A. Replace Work, or portions of the Work, not complying with specified requirements.
- B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, Architect will direct one of the following remedies:
  1. The defective Work may remain, but the unit price will be adjusted to a new unit price at the discretion of Architect, or:
  2. The defective Work will be partially repaired to the instructions of the Architect, and the unit price will be adjusted to a new unit price at the discretion of Architect.
- C. The authority of the Architect to assess the defect and identify payment adjustment is final.

#### **1.07 SCHEDULE OF UNIT PRICES**

- A. Item: Unit Price No. 1 - Undercut/Fill in Trench Excavations.
  1. Description: Removal of unsuitable soils encountered at subgrade elevations and replacement with suitable off site washed stone material in trench excavations (including footings) as authorized by the Architect, including disposal of excavated unsuitable materials off site, if required, and as further required in Division 31- Earthwork.
  2. Unit of Measurement: Cubic Yards Excavated
  3. Amount to be included in Base Bid: 250 cubic yards.
- B. Item: Unit Price No. 2 - Undercut/Fill in Open Excavations.
  1. Description: Removal of unsuitable soils encountered in open excavations and replacement with suitable off site fill material as authorized by the Architect, including disposal of excavated unsuitable materials off site, if required, and as further defined in Division 31 - Earthwork.
  2. Unit of Measurement: Cubic Yards Excavated
  3. Amount to be included in Base Bid: 2,000 cubic yards.
- C. Item: Unit Price No. 3 - Data Outlet and Conduit.
  1. Description: Provide labor and materials cost for installation of data outlet and conduit to above ceiling as delineated in the construction documents.
  2. Unit of Measurement: Per individual occurrence.
  3. Amount to be included in Base Bid: 4 occurrences.
- D. Item: Unit Price No. 4 - Duplex Receptacle and Circuit.
  1. Description: Provide labor and materials cost for installation of duplex receptacle and circuit to panelboard as delineated in the construction documents.
  2. Unit of Measurement: Per individual occurrence.
  3. Amount to be included in Base Bid: 4 occurrences.
- E. Item: Unit Price No. 5 - Septic Field Lines
  1. Description: Provide labor and materials cost for the installation of 4" EZ Flow Septic Lines and required trenching and backfill for installation of septic lines.
  2. Unit of Measurement: Linear Feet.
  3. Amount to be included in Base Bid: 500 Linear feet.
- F. Item: Unit Price No. 6; Septic Pump Station.
  1. Description: Provide labor and materials cost for the installation of a 1000 Gallon Pump Tank with Pump, Controls, and required power supply.
  2. Unit of Measurement: Lump Sum.
  3. Amount to be included in Base Bid: 1 Occurrence.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 23 00  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Alternates.
- B. Procedures for pricing Alternates.
- C. Documentation of changes to Contract Sum and Contract Time.

**1.02 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 the alternate.
- B. Notification: Immediately following award of the Contract, each party involved shall be notified in writing of the status of each alternate, in particular whether alternates have been accepted, rejected, or deferred for later consideration. Notification shall include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

**1.03 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

**1.04 SCHEDULE OF ALTERNATES**

- A. Alternate No. C-1 - Asphalt Drive and Parking:
  - 1. The contractor shall stipulate the amount to be deducted from the base bid for the installation of Asphalt Paving in-lieu of Concrete Paving at the Driving Pad as delineated on the Civil Drawings.
- B. Alternate No. C-2 - Brick at Entrance Gate:
  - 1. The contractor shall stipulate the amount to be added to the base bid for the installation brick columns as shown on sheet D-04. Base bid shall be painted steel pipe support posts in lieu of brick columns.
- C. Alternate No. C-3 - Gravel Truck Parking:
  - 1. The contractor shall stipulate the amount to be added to the base bid for the installation of the gravel truck parking as delineated in the civil plans. Base bid shall exclude the gravel truck parking.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 01 25 00  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  2. Agrees to provide the same warranty for the substitution as for the specified product.
  3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  4. Waives claims for additional costs or time extension that may subsequently become apparent.
  5. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    - a. Project Information:
      - 1) Official project name and number, and any additional required identifiers established in Contract Documents.
      - 2) Owner's, Architect's, and Contractor's names.
    - b. Substitution Request Information:
      - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
      - 2) Indication of whether the substitution is for cause or convenience.
      - 3) Issue date.
      - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
      - 5) Description of Substitution.
      - 6) Reason why the specified item cannot be provided.
      - 7) Differences between proposed substitution and specified item.
      - 8) Description of how proposed substitution affects other parts of work.
    - c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
      - 1) Physical characteristics.
      - 2) In-service performance.
      - 3) Expected durability.
      - 4) Visual effect.
      - 5) Sustainable design features.
      - 6) Warranties.
      - 7) Other salient features and requirements.
      - 8) Include, as appropriate or requested, the following types of documentation:
        - (a) Product Data:

- (b) Samples.
- d. Impact of Substitution:
  - 1) Savings to Owner for accepting substitution.
  - 2) Change to Contract Time due to accepting substitution.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

### **3.02 SUBSTITUTION PROCEDURES AFTER BIDDING PHASE**

- A. Architect will consider requests for substitutions only within 15 days after date of Agreement.
- B. Submit request for Substitution for Cause within 14 days of discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
  - 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  - 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  - 3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
- D. Substitutions will not be considered under one or more of the following circumstances:
  - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  - 2. Without a separate written request.
  - 3. When acceptance will require revisions to the Contract Documents.

### **3.03 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.

### **3.04 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

### **3.05 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

**END OF SECTION**

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Preconstruction meeting.
- C. Site mobilization meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Coordination drawings.
- H. Submittals for review, information, and project closeout.
- I. Number of copies of submittals.
- J. Submittal procedures.

**1.02 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

**1.03 PROJECT COORDINATOR**

- A. Project Coordinator: Construction Manager.
- B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for site access, traffic, and parking facilities.
- C. During construction, coordinate use of site and facilities through the Project Coordinator.
- D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 01 10 00 - Summary.
- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect through the Project Coordinator:
  - 1. Requests for Interpretation.
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for .
  - 11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. Architect will schedule a meeting after Notice of Award.
- B. Attendance Required:

1. Owner.
2. Architect.
3. Contractor.

C. Agenda:

1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
6. Scheduling.
7. Scheduling activities of a Geotechnical Engineer.

- D. Architect will record minutes and distribute copies within two days after meeting to participants, with one copy to participants, and those affected by decisions made.

### 3.02 SITE MOBILIZATION MEETING

- A. Contractor will schedule a meeting at the Project site prior to Contractor occupancy.

B. Attendance Required:

1. Contractor.
2. Owner.
3. Architect.
4. Contractor's superintendent.
5. Major subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Owner.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Application for payment procedures.
9. Procedures for testing.
10. Procedures for maintaining record documents.
11. Requirements for start-up of equipment.
12. Inspection and acceptance of equipment put into service during construction period.

- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

### 3.03 PROGRESS MEETINGS

- A. Contractor will schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

- B. Contractor will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required:

1. Contractor.
2. Owner.
3. Contractor's superintendent.
4. Major subcontractors.

D. Agenda:

1. Review minutes of previous meetings.

2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede, or will impede, planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to work.

- E. Contractor will record minutes and distribute copies within two days after meeting to participants, with one copy to participants, and those affected by decisions made.

### **3.04 CONSTRUCTION PROGRESS SCHEDULE - SEE SECTION 01 32 16**

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.

### **3.05 PROGRESS PHOTOGRAPHS**

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Photography Type: Digital; electronic files.
- C. Provide photographs of site and construction throughout progress of work produced Architect.
- D. In addition to periodic, recurring views, take photographs of each of the following events:
1. Completion of site clearing.
  2. Excavations in progress.
  3. Foundations in progress and upon completion.
  4. Structural framing in progress and upon completion.
  5. Enclosure of building, upon completion.
  6. Final completion, minimum of ten (10) photos.
- E. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until Date of Final Acceptance.
  2. Consult with Architect for instructions on views required.
  3. Provide factual presentation.
  4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- F. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
  2. File Naming: Include project identification, date and time of view, and view identification.
  3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

### **3.06 COORDINATION DRAWINGS**

- A. Provide information required by Project Coordinator for preparation of coordination drawings.
- B. Review drawings prior to submission to Architect Architect.

### **3.07 SUBMITTALS FOR REVIEW**

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

4. Samples for verification.
- B. Samples will be reviewed for aesthetic, color, or finish selection.
- C. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

### **3.08 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  1. Design data.
  2. Certificates.
  3. Test reports.
  4. Inspection reports.
  5. Manufacturer's instructions.
  6. Manufacturer's field reports.
  7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for OwnerArchitect. No action will be taken.

### **3.09 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Final Acceptance .
- B. Submit Final Correction Punch List for Final Acceptance.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Bonds.
  5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.10 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by ArchitectArchitect.
  1. After review, produce duplicates.
  2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.11 SUBMITTAL PROCEDURES**

- A. General Requirements:
  1. Use a separate transmittal for each item.
  2. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
- B. Product Data Procedures:
  1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
  1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.

2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Transmit each submittal with approved form.

**END OF SECTION**

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**SECTION 01 32 16**  
**CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule.
- B. Construction progress schedule, bar chart type.

**1.02 REFERENCE STANDARDS**

- A. AGC (CPSM) - Construction Planning and Scheduling Manual 2004.
- B. M-H (CPM) - CPM in Construction Management - Project Management with CPM 2015.

**1.03 SUBMITTALS**

- A. Within 10 days after date of Agreement, submit preliminary schedule.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Submit the number of opaque reproductions that Contractor requires, plus two copies that will be retained by Architect.
- G. Submit under transmittal letter form specified in Section 01 30 00 - Administrative Requirements.

**1.04 QUALITY ASSURANCE**

- A. Contractor's Administrative Personnel: three years minimum experience in using and monitoring CPM schedules on comparable projects.

**1.05 SCHEDULE FORMAT**

- A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.
- B. Diagram Sheet Size: Maximum 22 x 17 inches (560 x 432 mm).
- C. Scale and Spacing: To allow for notations and revisions.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

- A. Prepare preliminary schedule in the form of a horizontal bar chart.

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Identify work of separate stages and other logically grouped activities.
- D. Provide sub-schedules to define critical portions of the entire schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, Products identified under Allowances, and dates reviewed submittals

will be required from Architect. Indicate decision dates for selection of finishes.

- G. Indicate delivery dates for owner-furnished products and products identified under Allowances.
- H. Provide legend for symbols and abbreviations used.

### **3.03 BAR CHARTS**

- A. Include a separate bar for each major portion of Work or operation.
- B. Identify the first work day of each week.

### **3.04 REVIEW AND EVALUATION OF SCHEDULE**

- A. Participate in joint review and evaluation of schedule with ArchitectArchitect at each submittal.
- B. Evaluate project status to determine work behind schedule and work ahead of schedule.
- C. After review, revise as necessary as result of review, and resubmit within 10 days.

### **3.05 UPDATING SCHEDULE**

- A. Maintain schedules to record actual start and finish dates of completed activities.
- B. Indicate progress of each activity to date of revision, with projected completion date of each activity.
- C. Annotate diagrams to graphically depict current status of Work.
- D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.
- E. Indicate changes required to maintain Date of Final Acceptance .
- F. Submit reports required to support recommended changes.
- G. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

### **3.06 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, OwnerArchitect , and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

**END OF SECTION**

**SECTION 01 33 00  
SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. The Contract Documents, Drawings and individual Specification Sections, Contractor's Submission Schedule; apply to this Section.

**1.02 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

**1.03 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require the Design Professional'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 the Design Professional'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.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- D. Required Submittal List Utility application: Interacts with and to be used with the Owner's Contract Manager system. The Design Professional uses the utility to itemize the list of submission items needed to be submitted by the Contractor in order to insure the design intent will be satisfied and inclusive of all Project turnover documents and/or Contract Closeout Requirements.
- E. Contractor's Submission Schedule: The itemized list of project submission requirements printed as a report from Contract Manager. The Contractor enters the date each item needs to be submitted in order to meet the schedule.

**1.04 ACTION SUBMITTALS**

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by the construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
- B. Format for Submittals: Submit required submittals in electronic (PDF) file format.

**1.05 SUBMITTAL ADMINISTRATIVE REQUIREMENTS**

- A. Design Professional's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by the Design Professional for the Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with the performance of the Work.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Commissioning Authority will review submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the Design Professional review and approval.
  - 3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
  - a. Submit Operation and Maintenance Manuals concurrent with action submittal.
  - b. The Owner or Design Professional reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on the Design Professional'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 re-submittals.
  1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. The Design Professional will advise the Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Re-submittal Review: Allow 15 days for review of each re-submittal.
  4. Sequential Review: Where sequential review of submittals by the Design Professional's consultants, the Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
  1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by the Design Professional.
  3. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Design Professional.
    - d. Name of Construction Manager (if applicable).
    - e. Name of Contractor.
    - f. Name of subcontractor.
    - g. Name of supplier.
    - h. Name of manufacturer.
    - i. Submittal number including revision identifier.
      - 1) Submittal number shall be the submittal item number and Submittal Package number designated in the Contractor's Submission Schedule.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
  1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
  3. Provide means for insertion to permanently record the Contractor's review and approval markings and action taken by the Design Professional.
  4. Include the following information on an inserted cover sheet:
    - a. Project name.
    - b. Date.
    - c. Name and address of Design Professional.
    - d. Name of Construction Manager (if applicable).
    - e. Name of Contractor.
    - f. Name of firm or entity that prepared submittal.
    - g. Name of subcontractor.

- h. Name of supplier.
  - i. Name of manufacturer.
  - j. Number and title of appropriate Specification Section.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Related physical samples submitted directly.
  - n. Other necessary identification.
5. Include the following information as keywords in the electronic file meta data:
- a. Project name.
  - b. Number and title of appropriate Specification Section.
  - c. Manufacturer name.
  - d. Product name.
- F. Options: Identify options requiring selection by the Design Professional.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Copies: Unless the Design Professional observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. The Design Professional will return submittals, without review, received from sources other than the Contractor.
- 1. Transmittal Form: Use the Contractor's office form.
  - 2. Transmittal Form: Provide locations on form for the following information:
    - a. Project name.
    - b. Date.
    - c. Destination (To:).
    - d. Source (From:).
    - e. Names of subcontractor, manufacturer, and supplier.
    - f. Category and type of submittal.
    - g. Submittal purpose and description.
    - h. Specification Section number and title.
    - i. Indication of full or partial submittal.
    - j. Drawing number and detail references, as appropriate.
    - k. Transmittal numbered consecutively.
    - l. Submittal and transmittal distribution record.
    - m. Remarks.
    - n. Signature of transmitter.
  - 3. On an attached separate sheet, prepared on the Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by the Design Professional on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Re-submittals: Make re-submittals in same form and format.
- 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from the Design Professional's action stamp.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with approval notation from the Design Professional's action stamp.

## **PART 2 PRODUCTS**

### **2.01 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals via email as electronic (PDF) files, to the Design Professional. The Owner may request paper copies of certain submittals for on-site coordination.
    - a. The Design Professional will return annotated file. Annotate and retain one copy of file as an electronic Project turnover document file.
    - b. The Commissioning Authority through the Design Professional will return annotated file.
    - c. PDF file shall be named as follows:
      - 1) Section number, space, dash, space, Submittal number, space, Section name.
        - (a) 00 00 00 - 001 Section Name.
          - (1) The submittal number is section specific.
  - 2. Operation and Maintenance Manual Submittals: Submit concurrent with the Action Submittal, as related in individual Specification Sections.
  - 3. Closeout Submittals: Comply with requirements specified in Section 01 78 00 - Closeout Submittals.
  - 4. Permits, Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Permits, Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. 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 not suitable 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. Submittal Package number and Submittal Item number.
    - b. Manufacturer's catalog cuts.
    - c. Manufacturer's product specifications.
    - d. Standard color charts.
    - e. Statement of compliance with specified referenced standards.
    - f. Testing by recognized testing agency.
    - g. Application of testing agency labels and seals.
    - h. Notation of coordination requirements.
    - i. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing 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 concurrent with Samples.
  - 6. Submit Product Data in electronic (PDF) file format.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Submittal Package number and Submittal Item number.
    - b. Identification of products.

- c. Schedules.
  - d. Compliance with specified standards.
  - e. Notation of coordination requirements.
  - f. Notation of dimensions established by field measurement.
  - g. Relationship and attachment to adjoining construction clearly indicated.
  - h. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
  3. Submit Shop Drawings in electronic (PDF) file format.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Submittal Package number and Submittal Item number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
  3. 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 the Owner's property, are the property of the Contractor.
  4. 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: For turnover purpose, submit three full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Design Professional will return submittal with options selected.
  5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit three sets of Samples. The Design Professional will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a turnover sample.
      - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. 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, and telephone number 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.
  4. Submit subcontract list in PDF electronic file, to the Owner.
- F. 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.
- G. 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 American Welding Society (AWS) forms. Include names of firms and personnel certified.
- H. Installer Certificates: Upon the Owner's request, 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.
- I. Manufacturer Certificates: Upon the Owner's request, submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- J. 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.
- K. 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.
- L. Field Test Reports: Submit 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.

### **PART 3 EXECUTION**

#### **3.01 CONTRACTOR'S REVIEW**

- A. Action 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 the Design Professional.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of the Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### **3.02 DESIGN PROFESSIONAL'S ACTION**

- A. General: The Design Professional will not review submittals that do not bear the Contractor's approval stamp and will return them without action.
- B. Action Submittals: The Design Professional will review each submittal, make marks to indicate corrections or modifications required, and return it.
- C. Informational Submittals: The Design Professional will review each submittal and will return it if it does not comply with requirements.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from the Design Professional.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.



- G. On projects that have commissioning, the Commissioning Authority will receive copies of the submittals through the Design Professional and will provide comments on the submittals via the Design Professional.

**END OF SECTION**

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**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. References and standards.
- C. Testing and inspection agencies and services.
- D. Control of installation.
- E. Mock-ups.
- F. Tolerances.
- G. Manufacturers' field services.
- H. Defect Assessment.

**1.02 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2023.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Compliance with Contract Documents.
    - k. When requested by Architect, provide interpretation of results.
  - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for Contractor's information.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect/Architect.
- D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- E. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Contractor.
- F. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Contractor.
  1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.
  2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Contractor.

#### **1.04 REFERENCES AND STANDARDS**

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Final Acceptance.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

#### **1.05 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Contractor shall employ and pay for services of an independent testing agency to perform specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
  1. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
  2. Laboratory: Authorized to operate in the State in which the Project is located.
  3. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  4. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION**

#### **3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

### **3.02 MOCK-UPS**

- A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by ArchitectArchitect.

### **3.03 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from ArchitectArchitect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

### **3.04 TESTING AND INSPECTION**

- A. See individual specification sections for testing and inspection required.
- B. In addition to testing required by individual specification sections the Contractor shall scope and provide video documentation of all sanitary lines up to connection with municipal service.
  - 1. Inspection shall be performed and documentation provided to Architect prior to Final Acceptance.
  - 2. Video systems used shall be capable of navigating within project system conditions.
  - 3. Recording shall be in focus with proper lighting and provide a clear undistorted image for the entire length of the recording.
  - 4. Cross reference and label each video corresponding to individual lines as delineated on the plans.
    - a. Use same nomenclature as plans.
  - 5. Video shall be continuous for the entire length of the line being inspected.
  - 6. Provide written documentation of any observed defects.
    - a. Cross reference with time location in video and physical location on plan.
- C. Installation of all through-wall and concealed flashing shall be visually inspected by the Architect prior to concealment.
- D. Testing Agency Duties:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.

6. Perform additional tests and inspections required by Architect/Engineer.
  7. Submit reports of all tests/inspections specified.
- E. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.
  3. Agency may not assume any duties of Contractor.
  4. Agency has no authority to stop the Work.
- F. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency as original testing.
- H. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### **3.05 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

### **3.06 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**

**SECTION 01 50 00**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Waste removal facilities and services.
- G. Project identification sign.
- H. Field offices.

**1.02 TEMPORARY UTILITIES - SEE SECTION 01 51 00**

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing facilities may not be used.
- C. New permanent facilities may be used.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

**1.03 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
  - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
  - 2. Telephone Land Lines: One line, minimum; one handset per line.
  - 3. Internet Connections: Minimum of one; DSL modem or faster.
  - 4. Email: Account/address reserved for project use.
- C. Contractor will pay for own telecommunications services.
- D. WiFi Access: Provide WiFi for use by Architect and Engineer until time of Final Acceptance.

**1.04 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

**1.05 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 FENCING**

- A. Construction: Commercial grade chain link fence.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

### **1.07 EXTERIOR ENCLOSURES**

- A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

### **1.08 SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

### **1.09 VEHICULAR ACCESS AND PARKING**

- A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
- B. Coordinate access and haul routes with governing authorities and Owner.
- C. Provide and maintain access to fire hydrants, free of obstructions.
- D. Provide means of removing mud from vehicle wheels before entering streets.
- E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

### **1.10 WASTE REMOVAL**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

### **1.11 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design and construction indicated on drawings.
- B. Erect on site at location established by Architect .
- C. No other signs are allowed without Owner permission except those required by law.

### **1.12 FIELD OFFICES - SEE SECTION 01 52 13**

### **1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Acceptance inspection.
- B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore new permanent facilities used during construction to specified condition.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**SECTION 01 51 00  
TEMPORARY UTILITIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

**1.02 TEMPORARY ELECTRICITY**

- A. Cost: By Contractor.
- B. Provide power service required from utility source.
- C. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- D. Provide main service disconnect and over-current protection at convenient location and meter.
- E. Permanent convenience receptacles may be utilized during construction.
- F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

**1.03 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Cost: By Contractor.
- B. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft (to achieve a minimum lighting level of 21 watt/sq m).
- C. Provide and maintain 0.25 watt/sq ft (2.7 watt/sq m) H.I.D. lighting to interior work areas after dark for security purposes.
- D. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- E. Maintain lighting and provide routine repairs.
- F. Permanent building lighting may be utilized during construction.

**1.04 TEMPORARY HEATING**

- A. Cost of Energy: By Contractor.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

**1.05 TEMPORARY COOLING**

- A. Cost of Energy: By Contractor.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F (26 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.

**1.06 TEMPORARY VENTILATION**

- A. Cost: By Contractor.
- B. Utilize appropriate ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

**1.07 TEMPORARY WATER SERVICE**

- A. Cost of Water Used: By Contractor.
- B. Provide and maintain suitable quality water service for construction operations at time of project mobilization.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 52 13  
FIELD OFFICES AND SHEDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary field offices for use of Contractor.
- B. Maintenance and removal.

**PART 2 PRODUCTS**

**2.01 MATERIALS, EQUIPMENT, FURNISHINGS**

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

**2.02 CONSTRUCTION**

- A. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
- B. Construction: Structurally sound, secure, weather tight enclosures for office. Maintain during progress of Work; remove when no longer needed.
- C. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy requirements.
- D. Exterior Materials: Weather resistant, finished in one color.
- E. Interior Materials in Offices: Sheet type materials for walls and ceilings, prefinished or painted; resilient floors and bases.
- F. Lighting for Offices: 50 fc (538 lx) at desk top height, exterior lighting at entrance doors.
- G. Fire Extinguishers: Appropriate type fire extinguisher at each office.

**2.03 ENVIRONMENTAL CONTROL**

- A. Heating, Cooling, and Ventilating: Automatic equipment to maintain comfort conditions.

**2.04 CONTRACTOR OFFICE AND FACILITIES**

- A. Size: For Contractor's needs and to provide space for project meetings.
- B. Telephone: As specified in Section 01 50 00.
- C. Furnishings in Meeting Area: Conference table and chairs to seat at least eight persons; racks and files for Contract Documents, submittals, and project record documents.
- D. Other Furnishings: Contractor's option.
- E. Equipment: Six adjustable band protective helmets for visitors, one 10 inch (250 mm) outdoor weather thermometer .

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Fill and grade sites for temporary structures to provide drainage away from buildings.

**3.02 INSTALLATION**

- A. Install office spaces ready for occupancy 15 days after date fixed in Notice to Proceed.

**3.03 MAINTENANCE AND CLEANING**

- A. Weekly/Periodic cleaning and maintenance.
- B. Maintain approach walks free of mud, water, and snow.

**3.04 REMOVAL**

- A. At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

**END OF SECTION**

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**SECTION 01 57 13**  
**TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Performance bond.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

**1.02 REFERENCE STANDARDS**

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus 2021.
- B. ASTM D4491/D4491M - Standard Test Methods for Water Permeability of Geotextiles by Permittivity 2022.
- C. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2015 (Reapproved 2023).
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- E. ASTM D4751 - Standard Test Methods for Determining Apparent Opening Size of a Geotextile 2021a.
- F. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2017 (Reapproved 2021).
- G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit Current Edition.
- H. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control 1995.
- I. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service 2015.
- J. NCDENR Erosion Control Handbook NC Department of Environment and Natural Resources.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Also comply with all more stringent requirements of State of NC Erosion and Sedimentation Control Manual.
- C. Comply with all requirements of NC DENR for erosion and sedimentation control .
- D. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- E. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
  - 1. Owner will obtain permits and pay for securities required by authority having jurisdiction.
  - 2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- F. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation

control work.

- G. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- H. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
  - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
  - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 10 years.
- I. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
  - 1. Control movement of sediment and soil from temporary stockpiles of soil.
  - 2. Prevent development of ruts due to equipment and vehicular traffic.
  - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- J. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
  - 1. Prevent windblown soil from leaving the project site.
  - 2. Prevent tracking of mud onto public roads outside site.
  - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- K. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- L. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- M. Open Water: Prevent standing water that could become stagnant.
- N. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.
- D. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Final Acceptance.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Mulch: Use one of the following:
  - 1. Straw or hay.
  - 2. Wood waste, chips, or bark.
  - 3. Erosion control matting or netting.
  - 4. Cutback asphalt.
  - 5. Polyethylene film, where specifically indicated only.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Bales: Air dry, rectangular straw bales.
  - 1. Cross Section: 14 by 18 inches (350 by 450 mm), minimum.
  - 2. Bindings: Wire or string, around long dimension.
- D. Bale Stakes: One of the following, minimum 3 feet (1 m) long:
  - 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot (1.98 kg per linear m).
  - 2. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
- E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
  - 1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D4751.
  - 2. Permittivity:  $0.05 \text{ sec}^{-1}$ , minimum, when tested in accordance with ASTM D4491/D4491M.
  - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
  - 4. Tensile Strength: 100 pounds-force (450 N), minimum, in cross-machine direction; 124 pounds-force (550 N), minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
  - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
  - 6. Tear Strength: 55 pounds-force (245 N), minimum, when tested in accordance with ASTM D4533/D4533M.
  - 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
  - 8. Manufacturers:
    - a. TenCate: [www.tencate.com/#sle](http://www.tencate.com/#sle).
    - b. North American Green: [www.nagreen.com/#sle](http://www.nagreen.com/#sle).
    - c. Propex Geosynthetics: [www.geotextile.com/#sle](http://www.geotextile.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long:
  - 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot (1.98 kg per linear m).
  - 2. Softwood, 4 by 4 inches (100 by 100 mm) in cross section.
- G. Gravel: See Section 32 11 23 for aggregate.
- H. Riprap: See Section 31 37 00.
- I. Concrete: See Section 03 30 00.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### 3.02 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

### 3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  - 1. Width: As shown on plan.
  - 2. Length: As shown on plan.
  - 3. Provide at each construction entrance from public right-of-way.
  - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
  - 1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart (at maximum of 60 m apart).
    - e. Across the entrances to culverts that receive runoff from disturbed areas.
  - 2. Space sediment barriers with the following maximum slope length upslope from barrier:
    - a. Slope of Less Than 2 Percent: 100 feet (30 m)..
    - b. Slope Between 2 and 5 Percent: 75 feet (23 m).
    - c. Slope Between 5 and 10 Percent: 50 feet (15 m).
    - d. Slope Between 10 and 20 Percent: 25 feet (7.5 m).
    - e. Slope Over 20 Percent: 15 feet (4.5 m).
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
  - 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- H. Temporary Seeding: Use where temporary vegetated cover is required.

### 3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
  - 1. Excavate minimum of 6 inches (150 mm).
  - 2. Place and compact at least 6 inches (150 mm) of 1 1/2 to 3 1/2 inch (40 to 90 mm) diameter stone.
- B. Silt Fences:
  - 1. Store and handle fabric in accordance with ASTM D4873/D4873M.
  - 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch (405 mm) high barriers with minimum 36 inch (905 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 4 inches (100 mm) in ground.



3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch (710 mm) high barriers, minimum 48 inch (1220 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
  4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet (6 m), use nominal 32 inch (810 mm) high barriers with woven wire reinforcement and steel posts spaced at 4 feet (1220 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
  5. Repair/re-Install silt fence with top of fabric at nominal height and embedment as specified.
  6. Embed bottom of fabric in a trench on the upslope side of fence, with 6 inches (150 mm) of fabric laid flat on bottom of trench facing upslope; backfill trench and compact.
  7. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with extra post.
  8. Fasten fabric to wood posts using one of the following:
    - a. Four nails per post with 3/4 inch (19 mm) diameter flat or button head, 1 inch (25 mm) long, and 14 gauge, 0.083 inch (2.11 mm) shank diameter.
    - b. Five staples per post with at least 17 gauge, 0.0453 inch (1.150 mm) wire, 3/4 inch (19 mm) crown width and 1/2 inch (12 mm) long legs.
  9. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
- C. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
  2. Install bales so that bindings are not in contact with the ground.
  3. Embed bales at least 4 inches (100 mm) in the ground.
  4. Anchor bales with at least two stakes per bale, driven at least 18 inches (450 mm) into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
  5. Fill gaps between ends of bales with loose straw wedged tightly.
  6. Place soil excavated for trench against bales on the upslope side of the row, compacted.
- D. Mulching Over Large Areas:
1. Dry Straw and Hay: Apply 2-1/2 tons per acre (6350 kg per hectare); anchor using dull disc harrow.
  2. Wood Waste: Apply 6 to 9 tons per acre (15,200 to 20,800 kg per hectare).
  3. Asphalt: Apply at 1200 gallons per acre (11,000 L per hectare).
  4. Erosion Control Matting: Comply with manufacturer's instructions.
- E. Mulching Over Small and Medium Areas:
1. Dry Straw and Hay: Apply 4 to 6 inches (100 to 150 mm) depth.
  2. Wood Waste: Apply 2 to 3 inches (50 to 75 mm) depth.
  3. Erosion Control Matting: Comply with manufacturer's instructions.
- F. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
  2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
  3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft (0.5 kg per 100 sq m).
  4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
  5. Incorporate fertilizer into soil before seeding.
  6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
  7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.

8. Repeat irrigation as required until grass is established.

### **3.05 MAINTENANCE**

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
  1. Promptly replace fabric that deteriorates unless need for fence has passed.
  2. Remove silt deposits that exceed one-third of the height of the fence.
  3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
  1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
  2. Remove silt deposits that exceed one-half of the height of the bales.
  3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.

### **3.06 CLEAN UP**

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

**END OF SECTION**

**SECTION 01 58 13**  
**TEMPORARY PROJECT SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project identification sign.
- B. Project informational signs.

**1.02 QUALITY ASSURANCE**

- A. Design sign and structure to withstand 50 miles/hr (80 km/hr) wind velocity.
- B. Sign Painter: Experienced as a professional sign painter for minimum three years.
- C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

**PART 2 PRODUCTS**

**2.01 SIGN MATERIALS**

- A. Structure and Framing: New, wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inch (19 mm) thick, standard large sizes to minimize joints.
- C. Rough Hardware: Galvanized.
- D. Paint and Primers: Exterior quality, two coats; sign background of color as selected.
- E. Lettering: Exterior quality paint, contrasting colors.

**2.02 PROJECT IDENTIFICATION SIGN**

- A. One painted sign of construction, design, and content indicated on drawings, location designated.
  - 1. Sign shall be two sided "sandwich" construction over posts.
- B. Content - As shown on plans and:
  - 1. Project number, title, logo and name of Owner as indicated on Contract Documents.
  - 2. Color rendering of proposed buildings.
  - 3. Names and titles of Architect and Consultants.
  - 4. Name of Prime Contractor and major Subcontractors.
- C. Graphic Design, Colors, Style of Lettering: As shown on plans.

**2.03 PROJECT INFORMATIONAL SIGNS**

- A. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering to provide legibility at 100 foot (30 m) distance.
- B. Provide at each field office, storage shed. Relocate as Work progress requires.
- C. Provide municipal traffic agency directional traffic signs to and within site.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at location of high public visibility adjacent to main entrance to site.
- C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

**3.02 MAINTENANCE**

- A. Maintain signs and supports clean, repair deterioration and damage.

**3.03 REMOVAL**

- A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

**END OF SECTION**

**SECTION 01 60 00  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Procedures for Owner-supplied products.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 SUBMITTALS**

- A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
  - 1. Submit within 15 days after date of Notice to Proceed.
  - 2. For products specified only by reference standards, list applicable reference standards.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Reused Products: Reused products include materials and equipment previously used in this or other construction, salvaged and refurbished as specified.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. DO NOT USE products having any of the following characteristics:
  - 1. Made using or containing CFC's or HCFC's.

### **2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

### **2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver and place in location as directed; obtain receipt prior to final payment.

## **PART 3 EXECUTION**

### **3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 01 25 00 - Substitution Procedures.
- B. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period and the documents required.

### **3.02 OWNER-SUPPLIED PRODUCTS**

- A. Owner's Responsibilities:
  - 1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  - 2. Arrange and pay for product delivery to site.
  - 3. On delivery, inspect products jointly with Contractor.
  - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - 5. Arrange for manufacturers' warranties, inspections, and service.
- B. Contractor's Responsibilities:
  - 1. Review Owner reviewed shop drawings, product data, and samples.
  - 2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
  - 3. Handle, store, install and finish products.
  - 4. Repair or replace items damaged after receipt.

### **3.03 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### **3.04 STORAGE AND PROTECTION**

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

excessive materials handling and misapplication.

- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

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**SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Pre-installation meetings.
- C. Cutting and patching.
- D. Surveying for laying out the work.
- E. Cleaning and protection.
- F. Starting of systems and equipment.
- G. Demonstration and instruction of Owner personnel.
- H. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- I. General requirements for maintenance service.

**1.02 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2013.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in conformance with Contract Documents.
  - 3. Submit surveys and survey logs for the project record.
- C. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities.

**1.04 QUALIFICATIONS**

- A. For survey work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect/Architect. Submit evidence of Surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- B. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located.

**1.05 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  - 1. Minimize amount of bare soil exposed at one time.
  - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  - 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- G. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- H. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- I. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### **1.06 COORDINATION**

- A. See Section 01 10 00 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

### **PART 2 PRODUCTS**

#### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Architect, participants, and those affected by decisions made.

### **3.04 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Control datum for survey is that indicated on drawings.
- D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- G. Utilize recognized engineering survey practices.
- H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Building foundation, column locations, ground floor elevations.
- I. Periodically verify layouts by same means.
- J. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.
- B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- F. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.06 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-conforming work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.07 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Prohibit traffic from landscaped areas.
- H. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.09 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect and owner seven days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- E. Verify that wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.10 DEMONSTRATION AND INSTRUCTION**

- A. See Section 01 79 00 - Demonstration and Training.

### **3.11 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.
- B. Testing, adjusting, and balancing HVAC systems: See Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

### **3.12 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Replace filters of operating equipment.

- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### 3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect.
- B. Final Acceptance.
  - 1. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Final Acceptance.
  - 2. Notify Architect when work is considered ready for Architect's Final Acceptance inspection.
  - 3. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.
  - 4. Submit necessary warranties, bonds, maintenance agreements, final certifications and similar documents as warranted by the project.
  - 5. Obtain and submit releases enabling Owner use of the space; include necessary permits and similar releases.
  - 6. Change construction cores to permanent cores and deliver keys to owner.
  - 7. Complete start-up testing of systems, operating instructions for owner's assigned personnel.
  - 8. Complete final cleaning and touch-up requirements.
  - 9. Provide copy of contractor's completed punchlist.
    - a. Contractor is responsible for completing his own punchlist prior to inspection.
  - 10. Accompany Architect on preliminary final inspection to determine items to be listed for completion or correction in Contractor's Notice of Final Acceptance.
  - 11. Architect will proceed with inspection or notify contractor of discrepancies.
    - a. Architect will suspend inspection in the event that the project is found not to be ready for inspection.
  - 12. Architect will prepare Certificate of Final Acceptance following inspection and correction of any deficiencies.
- C. Final Inspection/Acceptance.
  - 1. Refer to Instructions to Bidders and General Conditions of The Contract for additional requirements.
  - 2. Notify Architect when project is complete.
  - 3. Final inspection will not be scheduled until all contracts are completed unless approved otherwise or allowed by exception in General Conditions.
  - 4. Notify Architect that punch list items have been corrected and project is ready for a final formal inspection.
  - 5. Architect will certify in writing that all punch list items have been completed and schedule formal final inspection with the Owner.
  - 6. The Architect will furnish written notice of the final formal inspection not less than seven (7) days prior to the inspection.
  - 7. Architect will coordinate Final Formal inspection with all parties.
  - 8. Upon acceptance of project by the Owner the Architect will provide Certificate of Compliance.
- D. Owner will occupy all of the building as specified in Section 01 10 00.
- E. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

- F. Notify Architect when work is considered finally complete and ready for Architect's Formal final inspection.
- G. Complete items of work determined by ArchitectArchitect listed in executed Formal Inspection.

**3.14 MAINTENANCE**

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Final Acceptance or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

**END OF SECTION**

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**SECTION 01 74 19**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- B. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- C. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- D. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.
  - 4. Other illegal dumping or burying.
- E. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

**1.02 DEFINITIONS**

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- G. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- H. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  - 2. Submit Report on a form acceptable to Owner.
  - 3. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Recycled and Salvaged Materials: Include the following information for each:
  - a. Identification of material, including those retrieved by installer for use on other projects.
  - b. Amount, in tons or cubic yards (cubic meters), date removed from the project site, and receiving party.
  - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
  - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
5. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 50 00 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 01 70 00 for trash/waste prevention procedures related to cutting and patching, installation, protection, and cleaning.

**END OF SECTION**

**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Operation and Maintenance Data.
- B. Warranties and bonds.

**1.02 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. ArchitectArchitect will review draft and return one copy with comments.
  - 2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
  - 3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 4. Submit two sets of revised final documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
  - 2. Make other submittals within 10 days after Date of Final Acceptance, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Final Acceptance, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

**3.02 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  - 1. Product data, with catalog number, size, composition, and color and texture designations.
  - 2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

### **3.03 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  - 1. Description of unit or system, and component parts.
  - 2. Identify function, normal operating characteristics, and limiting conditions.
  - 3. Include performance curves, with engineering data and tests.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operation and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide control diagrams by controls manufacturer as installed.
- K. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- L. Include test and balancing reports.
- M. Additional Requirements: As specified in individual product specification sections.

### **3.04 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- D. Prepare data in the form of an instructional manual.
- E. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

- G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of <1|A/E|>, <3|Contractor|>, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.
    - c. Parts list for each component.
    - d. Operating instructions.
    - e. Maintenance instructions for equipment and systems.
    - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Shop drawings and product data.
    - b. Air and water balance reports.
    - c. Certificates.
    - d. Photocopies of warranties and bonds.
- N. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of <1|A/E|> Consultants and <3|Contractor|> with name of responsible parties; schedule of products and systems, indexed to content of the volume.

### **3.05 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Architect's permission, leave date of beginning of time of warranty until Date of Final Acceptance is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.
- F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.
- G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which

specified, and the name of product or work item.

- H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

**END OF SECTION**

**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Items specified in individual product Sections.
- C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
  - 1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
  - 2. Finishes, including flooring, wall finishes, ceiling finishes.
  - 3. Fixtures and fittings.
  - 4. Items specified in individual product Sections.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Architect for transmittal to Owner/Architect.
  - 2. Submit not less than four weeks prior to start of training.
  - 3. Revise and resubmit until acceptable.
  - 4. Provide an overall schedule showing all training sessions.
  - 5. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
  - 1. Identification of each training session, date, time, and duration.
  - 2. Sign-in sheet showing names and job titles of attendees.
  - 3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.

**1.03 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.

1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  1. Perform demonstrations not less than two weeks prior to Final Acceptance.
  2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  1. Perform demonstrations not less than two weeks prior to Final Acceptance.

### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
  1. Review the applicable O&M manuals.
  2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  4. Provide hands-on training on all operational modes possible and preventive maintenance.
  5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  6. Discuss common troubleshooting problems and solutions.
  7. Discuss any peculiarities of equipment installation or operation.
  8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  10. Review spare parts and tools required to be furnished by Contractor.
  11. Review spare parts suppliers and sources and procurement procedures.



- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**

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**SECTION 03 15 00  
CONCRETE ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Installation of PVC joint cap for expansion joints.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Submit manufacturer's product data and application instructions.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. W. R. Meadows, Inc.: [www.wrmeadows.com](http://www.wrmeadows.com).
- B. Hohmann & Barnard, Inc.: [www.h-b.com](http://www.h-b.com).
- C. BoMetals, Inc.: [www.bometals.com](http://www.bometals.com).
- D. Substitutions: See Section 01 60 00 – Product Requirements.

**2.02 MATERIALS**

- A. Expansion Joint Cap: Made of long-lasting PVC that is non-corrosive, flexible, and compatible with expansion joint fillers and joint sealants to provide an effective expansion and contraction joint system.
- B. Product: SNAP-CAP Expansion Joint Cap by W. R. MEADOWS Basis of Design or approved substitution.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Examine surfaces to receive expansion joint cap. Notify architect if surfaces are not acceptable. Do not begin installation until unacceptable conditions have been corrected.
- B. Prior to installation, ensure compatibility of materials to be in contact with expansion joint cap.

**3.02 INSTALLATION**

- A. Install at all exterior locations where indicated on drawings and where expansion joints abut the building.
- B. Slide expansion joint cap over the top of the expansion joint filler.
- C. Place the concrete and screed to finish grade.
- D. When concrete is cured, insert a screwdriver through the top of expansion joint cap, pull free and discard.
- E. Apply compatible joint sealant according to joint sealant manufacturer's instructions.

**END OF SECTION**

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**SECTION 03 30 00  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Floors and slabs on grade.
- C. Concrete footings.
- D. Concrete reinforcement.
- E. Joint devices associated with concrete work.
- F. Miscellaneous concrete elements, including equipment pads, light pole bases, thrust blocks, and manholes.
- G. Concrete curing.

**1.02 REFERENCE STANDARDS**

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- B. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete 1998 (Reapproved 2004).
- D. ACI 301 - Specifications for Concrete Construction 2020.
- E. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- F. ACI 305R - Guide to Hot Weather Concreting 2020.
- G. ACI 306R - Guide to Cold Weather Concreting 2016.
- H. ACI 308R - Guide to External Curing of Concrete 2016.
- I. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- J. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).
- K. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- M. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- N. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.
- O. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- P. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.
- Q. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- R. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- S. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- T. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- U. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers 2020.

- V. ASTM E1155M - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers (Metric) 2014.
- W. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
- X. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. See Section 01 30 00-Administrative Requirements for procedures.
- B. Preinstallation Conference: Conduct conference at Project site.
  - 1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete Subcontractor.
  - 2. Review the following:
    - a. Testing and inspecting agency procedures for field quality control.
    - b. Construction joints, control joints, isolation joints, and joint-filler strips.
    - c. Semirigid joint fillers.
    - d. Vapor-retarder installation.
    - e. Anchor rod and anchorage device installation tolerances.
    - f. Cold and hot weather concreting procedures.
    - g. Concrete finishes and finishing.
    - h. Curing procedures.
    - i. Methods for achieving specified floor and slab flatness and levelness.
    - j. Floor and slab flatness and levelness measurements.
    - k. Concrete repair procedures.
    - l. Concrete protection.
    - m. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
    - n. Protection of field cured field test cylinders.

### 1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
  - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
  - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
  - 3. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
- D. Shop Drawings: Submit shop drawings for steel reinforcement.
- E. Samples: Submit samples of underslab vapor retarder to be used.
- F. Test Reports: Submit report for each test or series of tests specified.
- G. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- H. Cold-weather/Hot-weather Concrete Placement Procedure Plan: Indicate steps and procedures to be undertaken during placement during cold and hot weather conditions.
- I. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

- J. Certificates for all materials, signed by manufacturers.
- K. Material Test Reports from a qualified testing agency, indicating compliance with requirements.
  - 1. Aggregates.
- L. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- M. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- N. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- O. Minutes of preinstallation conference.

#### **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
  - 1. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.
- E. Manufacturer Qualifications: Firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities".
- F. Perform work in accordance with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
- G. Installer Qualifications: Installer with a successful record of a minimum of five (5) years of projects completed in similar size, construction type and scope as this project.
- H. Mix Design Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
  - 1. Personnel performing laboratory tests shall be ACI certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI certified Concrete Laboratory Testing Technician - Grade II.
- I. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- J. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- K. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

#### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Slabs with Porosity Inhibiting Admixture (PIA) or Moisture Vapor Reducing Admixture (MVRA): Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of the concrete.
  - 1. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.

## **PART 2 PRODUCTS**

### **2.01 FORMWORK**

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- C. Chamfer exterior corners and edges of permanently exposed concrete.
  - 1. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
- E. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

### **2.02 REINFORCEMENT MATERIALS**

- A. Fabricate and place steel reinforcement according to CRSI's "Manual of Standard Practice".
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
  - 1. Type: Deformed billet-steel bars.
- C. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
  - 1. Form: Flat Sheets.
  - 2. WWR Style: As indicated on drawings.
- D. Low Alloy Steel Reinforcing Bars: ASTM A 706, deformed.
- E. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch (1.29 mm).
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
    - a. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless steel bar supports.
  - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches (38 mm) of weathering surfaces.
  - 4. Smooth Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

### **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
  - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
  - 1. Acquire aggregates for entire project from same source.
  - 2. Maximum Coarse Aggregate Size: 3/4 inch nominal.
  - 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class C or F.



- E. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

#### **2.04 ADMIXTURES**

- A. Chemical Admixtures: Use of admixtures is at the contractor's discretion. When used provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
  2. Air Entrainment Admixture: ASTM C260/C260M.
    - a. Coordinate with requirements of polished concrete floor system.
  3. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
  4. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
  5. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
  6. Retarding Admixture: ASTM C494/C494M Type B.
  7. Water Reducing Admixture: ASTM C494/C494M Type A.
  8. Moisture Vapor Reducing Admixture (MVRA): Liquid, inorganic admixture free of volatile organic compounds (VOCs). Closes capillary systems formed during concrete curing to reduce moisture vapor emission and transmission. Reduces concrete shrinkage with no adverse effect on concrete properties or applied flooring.

#### **2.05 ACCESSORY MATERIALS**

- A. Underslab Vapor Retarder:
  1. See Section 07 26 00 - Underslab Vapor Retarder.
- B. Expansion and Isolation Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- C. Semirigid Joint Filler: Two component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- D. Agent: ASTM C 1059, Type II, non-redispersable, acrylic emulsion or styrene butadiene.
- E. Reglets: Fabricate reglets of not less than 0.022 inch thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot dip galvanized steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

#### **2.06 BONDING AND JOINTING PRODUCTS**

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Epoxy Bonding System:
- C. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
  1. Material: Compressible asphalt mastic with felt facers, complying with ASTM D 994, 1/4 inch thick (6 mm thick) and full depth of slab less 1/2 inch (full depth of slab less 12 mm).
- D. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches (150 mm) on center; ribbed steel stakes for setting.
  1. Provide removable plastic cap strip that forms wedge-shaped joint for sealant installation.

#### **2.07 LIQUID FLOOR TREATMENTS**

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
  1.
    - a. BASF Corporation.
    - b. ChemMasters, Inc.

- c. ChemTec International.
- d. Concrete Sealers USA.
- e. e. Dayton Superior.
- f. f. Euclid Chemical Company (The); an RPM company.
- g. g. Kaufman Products, Inc.
- h. h. Laticrete International, Inc.
- i. i. Nox-Crete Products Group.
- j. j. PROSOCO, Inc.
- k. k. SpecChem, LLC.
- l. l. US SPEC, Division of US MIX Company.
- m. m. Vexcon Chemicals Inc.
- n. n. V-Seal Concrete Sealers & Specialty Coatings.
- o. o. W.R. Meadows, Inc.

B. VOC Content: OTC complian

## 2.08 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
  - 1. Products:
    - a. Dayton Superior Corporation; \_\_\_\_\_ ; Sure Film (J-74): [www.daytonsuperior.com/#sle](http://www.daytonsuperior.com/#sle).
    - b. Euclid Chemical Company ; EUCOBAR: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - c. Kaufman Products Inc; VaporAid: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).
    - d. Nox-Crete Inc; Monofilm: [www.nox-crete.com/#sle](http://www.nox-crete.com/#sle).
    - e. SpecChem, LLC; SpecFilm Concentrate or SpecFilm: [www.specchemllc.com/#sle](http://www.specchemllc.com/#sle).
    - f. W. R. Meadows, Inc ; Evapre or Evapre-RTU: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - g. Substitutions: See Section 01 60 00 - Product Requirements.
  - B. Curing Compound, Non-dissipating: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
    - 1. Vehicle: Water-based.
    - 2. Manufacturers:
      - a. ChemMasters, Inc.
      - b. Concrete Sealers USA.
      - c. Dayton Superior.
      - d. Euclid Chemical Company
      - e. Kaufman Products Inc.
      - f. Lambert Corporation.
      - g. Laticrete International Inc.
      - h. Nox-Crete Products Group.
      - i. Spec Chem, LLC.
      - j. Vexcron Chemicals Inc.
      - k. W.R.Meadows.
      - l. Substitutions: See Section01 60 00-Product Requirements.
  - C. Curing and Sealing Compound, Low Gloss: Liquid, membrane-forming, clear, non-yellowing acrylic; complying with ASTM C1315 Type 1 Class A.
    - 1. Vehicle: Water-based.
    - 2. Solids by Mass: 25 percent, minimum.
    - 3. VOC Content: Products shall 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.
    - 4. Manufacturers:
      - a. ChemMasters, Inc.

- b. Concrete Sealers USA.
  - c. Dayton Superior.
  - d. Euclid Chemical Company
  - e. Kaufman Products Inc.
  - f. Lambert Corpotation.
  - g. Laticrete International Inc.
  - h. Nox-Crete Products Group.
  - i. Spec Chem, LLC.
  - j. Vexcron Chemicals Inc.
  - k. W.R.Meadows.
  - l. Substitutions: See Section01 60 00-Product Requirements.
- D. Moisture-Retaining Sheet: ASTM C171.
- 1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch (0.102 mm).
  - 2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard (1.71 kg/sq m).
- E. Water: Potable, not detrimental to concrete.

## 2.09 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
- C. Concrete Strength: Establish required average strength for each type of concrete on the basis of laboratory trial mixtures or field test data, or both, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
  - 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete and concrete with a water-cementitious materials ratio below 0.50.
- E. Ready Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94/C94M and ASTM C 1116, and furnish batch ticket information.
- F. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1 1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- G. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash: 25 percent.
- H. Limit water soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

## 2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 3000 psi at 28 days.
  - 2. Maximum Water Cementitious Materials Ratio: 0.55.
  - 3. Slump Limit: 4 inches plus or minus 1 inch at point of delivery (prior to pumping).
  - 4. Slump Limit for concrete containing high-range water-reducing admixture or plasticizing admixture: 8 inches maximum for concrete with approved design mix slump of 3 to 5 inches before adding high-range water-reducing admixture or plasticizing admixture.
  - 5. Air Content: 2 percent, plus or minus 1.5 percent at point of delivery (prior to pumping).

- B. Slabs on Grade: Proportion normal weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: 3000 psi at 28 days.
  - 2. Maximum Water Cementitious Materials Ratio: 0.55.
  - 3. Slump Limit: 4 inches plus or minus 1 inch at point of delivery (prior to pumping).
  - 4. Slump Limit for concrete containing high-range water-reducing admixture or plasticizing admixture: 8 inches maximum for concrete with approved design mix slump of 3 to 5 inches before adding high-range water-reducing admixture or plasticizing admixture.
  - 5. Air Content: 2 percent, plus or minus 1.5 percent at point of delivery (prior to pumping).
  - 6. Air Content: Do not allow air content of trowel finished floors to exceed 3 percent at point of delivery (prior to pumping).

## **2.11 MIXING**

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.
- C. Do not use shrinkage-reducing admixture (SRA) in same concrete batch with MVRA or PIA.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
  - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
  - 2. Use latex bonding agent only for non-load-bearing applications.
- E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches (150 mm). Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
  - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

### **3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS**

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths on bar supports spaced at a maximum of 48 inches on center in each direction to minimize sagging. Lap edges and ends of adjoining sheets 8" minimum. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

### **3.04 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.

- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.
- H. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- I. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect unless water is held back at plant and amount of held back water is printed on the batch ticket, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high range water reducing admixtures to mixture.
- J. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- K. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- L. Cold Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Contractor will submit cold weather concrete placement plan that will be used to undertake cold weather concrete placement techniques when required.
  - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

- M. Hot Weather Placement: Comply with ACI 305 and as follows. Contractor will submit hot weather concrete placement plan that will be used to undertake hot weather concrete placement techniques when required.
  - 1. Maintain concrete temperature below 90 deg F at time of placement.
- N. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- O. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- P. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### 3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 1/8 inch (3.175 mm) thick blade and cut at least 1 inch (25 mm) deep but not less than one quarter (1/4) the depth of the slab.

### 3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. An independent testing agency, as specified in Section 01 40 00, will inspect finished slabs for compliance with specified tolerances.
- B. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
  - 1. Exposed to View and Foot Traffic: F(F) of 35; F(L) of 25.
  - 2. Under Carpeting: F(F) of 35; F(L) of 25.
  - 3. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- C. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- D. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### 3.07 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch (6 mm) or more in height. Provide finish as follows:
  - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
  - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.

3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting and resilient flooring.
  2. Exterior concrete platforms, steps, ramps, and where indicated: Broom Finish.
  3. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.
    - a. Chemical Hardener: See Section 03 35 43.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

### 3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  1. Normal concrete: Not less than seven days.
  2. High early strength concrete: Not less than four days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
  1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
  2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  3. Final Curing: Begin after initial curing but before surface is dry.

### 3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- D. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
  1. Testing Frequency: Obtain composite sample(s) for each day's pour of each concrete mixture exceeding 5 cu. yd, but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
    - a. When frequency of testing will provide fewer than five compressive strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143; one test at point of placement (back of concrete truck) prior to conveyance by pump, bucket, etc. for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete

- consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal weight concrete; ASTM C 173 volumetric method, for structural lightweight concrete; one test at point of placement (back of concrete truck) prior to conveyance by pump, bucket, etc. for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31.
    - a. Cast and laboratory cure five, 6 inch by 12 inch (or seven 4 inch by 8 inch) standard cylinder specimens for each composite sample.
  6. Compressive Strength Tests: ASTM C 39; test one 6 by 12 inch (or one 4 by 8) laboratory cured specimen at 7 days and two 6 by 12 (or three 4 by 8 inch) laboratory cured specimens at 28 days and hold two 6 by 12 (or three 4 by 8 inch) laboratory cured specimens in reserve for 56 day test if required.
    - a. A compressive strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive strength tests equals or exceeds specified compressive strength and no compressive strength test value falls below specified compressive strength by more than 500 psi.
  8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28 day tests.
  9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  10. Additional Tests:
    - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
      - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301, section 1.6.6.3.
  11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

### **3.10 DEFECTIVE CONCRETE AND REPAIRS**

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and



stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- G. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

**END OF SECTION**

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**SECTION 03 35 43  
POLISHED CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Polished concrete system.
- B. Densifiers and hardeners.

**1.02 REFERENCE STANDARDS**

- A. ANSI/NFSI B101.1 - Test Method for Measuring the Wet SCOF of Hard-Surface Walkways 2020.
- B. ANSI/NFSI B101.3 - Test Method for Measuring the Wet DCOF of Hard Surface Walkways 2020.
- C. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems 2020.
- D. ASTM D4039 - Standard Test Method for Reflection Haze of High-Gloss Surfaces 2009 (Reapproved 2020).
- E. ASTM D5767 - Standard Test Method for Instrumental Measurement of Distinctness-of-Image (DOI) Gloss of Coated Surfaces 2018.
- F. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials 2016.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate work of this section with concrete floor placement and concrete floor curing.
- B. Preinstallation Meeting: Conduct a preinstallation meeting 10 days prior to start of work of this section.
  - 1. Items for Review:
    - a. Physical requirements of completed concrete slab and slab finish.
    - b. Location and timing of test areas.
    - c. Protection of surfaces not scheduled for finish application.
    - d. Surface preparation.
    - e. Application procedure and quality control.
    - f. Cleaning and protection of finish.
    - g. Coordination with other work.
  - 2. Require attendance of parties directly affecting work of this section, including:
    - a. Concrete installer.
    - b. Finish installer.
    - c. Contractor's representative.
  - 3. Notify parties one week in advance of date and time of meeting.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Product Data: Manufacturer's published data and installation instructions for concrete polishing system and finishing products, including manufacturer's installation instructions, information on compatibility of different products, and limitations.
- D. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- E. Installer's qualification statement.

**1.05 MOCK-UP**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.

- B. Mock-Up Size: 50 sq ft (4.6 sq m).
- C. Locate on site where directed.
- D. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
- E. Mock-up may remain as part of work.

## **PART 2 PRODUCTS**

### **2.01 POLISHED CONCRETE SYSTEM**

- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
  - 1. Manufacturer: PROSOCO, Inc; Consolideck Polished Concrete System: [www.prosoco.com/consolideck/#sle](http://www.prosoco.com/consolideck/#sle).
  - 2. Advanced Floor Products; Retro Plate System; [www.retroplatesystem.com](http://www.retroplatesystem.com).
  - 3. Ardex Americas; ARDEX Polished Concrete System; [www.ardexamericas.com](http://www.ardexamericas.com).
  - 4. Euclid Chemical Company, a RPM company; [www.euclidchemical.com](http://www.euclidchemical.com).
  - 5. L&M Construction Chemicals, a Laticrete International brand, Inc; [www.laticrete.com](http://www.laticrete.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 DENSIFIERS AND HARDENERS**

- A. Liquid Densifier and Hardener: Penetrating chemical compound, reacts with concrete, filling pores, hardening, and dustproofing.
  - 1. Composition: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
  - 2. UV Stability: No degradation or yellowing when tested in accordance with ASTM G154.
  - 3. Products:
    - a. PROSOCO, Inc; Consolideck LS: [www.prosoco.com/consolideck/#sle](http://www.prosoco.com/consolideck/#sle).
    - b. Advanced Floor Products; Retro Plate 99; [www.retroplatesystem.com](http://www.retroplatesystem.com).
    - c. Ardex Americas; PC 50 Lithium Densifier; [www.ardexamericas.com](http://www.ardexamericas.com).
    - d. Euclid Chemical Company, an RPM company; Euco Diamond Hard; [www.euclidchemical.com](http://www.euclidchemical.com).
    - e. L&M Construction Chemicals, Inc; FGS Hardener Plus; [www.laticrete.com](http://www.laticrete.com).
    - f. Substitutions: See Section 01 60 00-Product Requirements.

### **2.03 COATINGS**

- A. Coatings, General:
  - 1. Treated Material Slip Resistance: High traction range when tested according to ANSI/NFSI B101.1 and ANSI/NFSI B101.3.
  - 2. Stain Resistance: No adverse effect when tested according to ASTM D1308.
  - 3. UV Stability: No degradation or yellowing when tested according to ASTM G154.

### **2.04 ACCESSORY MATERIALS**

- A. Floor Cleaner: Type recommended by densifier manufacturer.
- B. Neutralizing Agents: Trisodium phosphate or ammonia necessary for neutralizing acid spills and for cleaning concrete substrate. Provide items in accordance with floor finish manufacturer's instructions, including thinners.
- C. Joint Filler: Epoxy filler and polyurea sealant, VOC compliant, non-staining, compatible with floor finish and recommended by floor finish manufacturer.
- D. Polishing Accessories: Polishing pads recommended by floor finishing manufacturer for application.
- E. Equipment: Recommended by densifier manufacturer.
  - 1. Scrubbing: Head pressure of 150 lbs., unless otherwise recommended by floor finishing manufacturer.

2. Grinding: Counter rotating head floor grinding machine and edge grinder.
3. Dust extraction system: Manufacturer's standard.
4. Grinding Heads: Metal bonded or resin bonded, applicable for application to achieve specified finish level.
5. Grinding Pads: Recommended by equipment manufacturer to achieve specified finish level.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that floor surfaces are clean and free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes and allow complete curing before application of concrete hardener and densifier. See Section 07 92 00.

#### **3.02 GENERAL**

- A. Apply materials in accordance with manufacturer's instructions.

#### **3.03 PREPARATION**

- A. Protect adjacent non-coated areas from drips, overflow, and overspray; avoid contact with metal, glass, and painted surfaces; immediately remove excess material.

#### **3.04 CONCRETE POLISHING**

- A. Grind and polish in multiple passes with each full pass in direction perpendicular to previous pass.
- B. Fill gaps, voids, and pop-outs during grinding operation.
- C. Apply densifier and hardener at specified rates and intervals.
- D. Final Polished Concrete Aggregate Exposure: Not to exceed CPC Class A - Cement Fines; cement fines, 85 to 95 percent; fine aggregates, 5 to 15 percent based on visual observation of overall area of polished floor versus Polished Concrete Aggregate Exposure Chart.
- E. Final Polished Concrete Appearance: CPC Level 2 - Satin, image clarity value 10 to 39 percent with haze index less than 10; 400 grit.

#### **3.05 PROTECTIVE TREATMENT**

- A. Apply coatings in accordance with manufacturer's instructions. Match approved mock-ups for color, texture, sealing, and workmanship.
- B. Apply manufacturer's recommended protective treatment material to clean, dry slab after mechanically polishing.
- C. Clean spills on slab surfaces immediately, with manufacturer's recommended chemicals and absorptive materials.
- D. No haze, white residue, streaking, or burnish marks permitted.

#### **3.06 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Final Polished Concrete Appearance: Test image clarity value and haze index prior to application of sealer at a rate of three tests per 1000 sq ft of polished concrete.
  1. Image clarity: Test with Image Clarity Meter in accordance with ASTM D5767.
  2. Haze index: Test with Glossmeter in accordance with ASTM D4039.
  3. Match approved mock-ups for texture, appearance, and workmanship.

#### **3.07 PROTECTION**

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

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- B. Protect finished surface as required and as recommended by manufacturer of polishing system until .

**END OF SECTION**

**SECTION 04 05 11**  
**MASONRY MORTARING AND GROUTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Mortar for masonry.

**1.02 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.
- B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; 2008.
- C. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- D. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
- F. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- I. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar 2017.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- K. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- L. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.
- M. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C270 is to be used.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C476 and test and evaluation reports to requirements of ASTM C1019.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Manufacturer's Installation Instructions: Submit packaged dry mortar manufacturer's installation instructions.

**1.04 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of the contract documents.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

**1.06 FIELD CONDITIONS**

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

## **PART 2 PRODUCTS**

### **2.01 MORTAR AND GROUT APPLICATIONS**

- A. Field-mix all mortar and grout.
- B. Mortar Color: Match existing unless otherwise indicated.
- C. Mortar Mix Designs: ASTM C270, Property Specification.
  - 1. Masonry below grade and in contact with earth: Type S.
  - 2. Exterior Masonry Veneer: Type N.
  - 3. Exterior Cavity Walls: Type S mortar with Type N pointing mortar.
  - 4. Exterior, Non-loadbearing Masonry: Type N.

### **2.02 MATERIALS**

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
  - 1. Color: Match existing.
- B. Portland Cement: ASTM C150/C150M.
  - 1. Type: Type I - Normal; ASTM C150/C150M.
  - 2. Color: Color as required to produce approved color sample.
- C. Masonry Cement: ASTM C91/C91M.
  - 1. Type: Type N; ASTM C91/C91M.
  - 2. Colored Mortar: Premixed cement as required to match Architectapproved color sample.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Mortar Aggregate: ASTM C144.
- F. Grout Aggregate: ASTM C404.
- G. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
  - 1. Color(s): Match existing.
- H. Water: Clean and potable.

### **2.03 MORTAR MIXING**

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

### **2.04 GROUT MIXING**

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.
- C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of grout.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

### **3.02 INSTALLATION**

- A. Install mortar and grout to requirements of section(s) in which masonry is specified.



- B. Work grout into masonry cores and cavities to eliminate voids.
- C. Do not install grout in lifts greater than 16 inches (400 mm) without consolidating grout by rodding.
- D. Do not displace reinforcement while placing grout.
- E. Remove excess mortar from grout spaces.

**3.03 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field tests, in accordance with provisions of Section 01 40 00 - Quality Requirements.
- B. Test and evaluate mortar in accordance with ASTM C780 procedures.

**END OF SECTION**

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**SECTION 04 20 00  
UNIT MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Clay facing brick.
- B. Reinforcement and anchorage.
- C. Flashings.
- D. Accessories.

**1.02 REFERENCE STANDARDS**

- A. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.
- B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2008.
- C. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- E. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- F. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- H. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.
- I. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- J. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- K. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- L. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2022b.
- M. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
- N. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- O. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- P. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) 2022.
- Q. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- R. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- S. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- T. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry 2020.
- U. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- V. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017.

- W. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane 2015, with Editorial Revision (2022).
- X. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- Y. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- Z. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.
- AA. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
- BB. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- C. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

### **1.05 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

### **1.06 MOCK-UPS**

- A. Construct a masonry wall as a mock-up panel sized 8 feet (2.4 m) long by 6 feet (1.8 m) high; include mortar, accessories, structural backup, and flashings (with lap joint, corner, and end dam) in mock-up.
- B. Locate where directed.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

## **PART 2 PRODUCTS**

### **2.01 BRICK UNITS**

- A. Facing Brick: ASTM C216, Type FBX, Grade SW.
  - 1. Color and texture: Color to be selected by Architect from manufacturer's full range..
  - 2. Nominal size: Modular.
  - 3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

### **2.02 MORTAR AND GROUT MATERIALS**

- A. Hydrated Lime: ASTM C207, Type S.
- B. Mortar Aggregate: ASTM C144.
- C. Grout Aggregate: ASTM C404.

### **2.03 REINFORCEMENT AND ANCHORAGE**

- A. Manufacturers:
  - 1. Heckmann Building Products, Inc.: [www.heckmannbuildingprods.com](http://www.heckmannbuildingprods.com).
  - 2. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
  - 3. Hohmann & Barnard, Inc: [www.h-b.com/sle](http://www.h-b.com/sle).
  - 4. WIRE-BOND [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa), deformed billet bars; galvanized.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
  - 1. Type: Ladder.
  - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
  - 3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 1/2 inch (12.7 mm) of mortar coverage on each exposure.
- D. Veneer Anchors: Provide anchoring system that complies with ACI 530.1/ASCE 6/TMS 602.
  - 1. Anchors to Metal Studs: Barrel and screw system.
    - a. Barrell Length: Sized to meet project conditions.
    - b. Screw Length: Sized to meet project conditions.
    - c. Screw Type: Self drilling for steel stud.
  - 2. Ties: Provide minimum 2 inches (50mm) embedment in mortar.
    - a. Wire: 3/16 inch diameter by length required for project conditions.
    - b. Material: Hot-dipped galvanized.

## 2.04 FLASHINGS

- A. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch (1.0 mm) thick.

## 2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
  - 1. Manufacturers:
    - a. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
    - b. Hohmann & Barnard, Inc: [www.h-b.com/sle](http://www.h-b.com/sle).
    - c. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Performance Characteristics:
    - a. Rubber: Conforming to ASTM D 2000 2 AA 805.
    - b. Durometer hardness: 85 (+/- 5) when tested with ASTM D 2240-05.
    - c. Length: Maximum available, 48" minimum.
    - d. Water Absorption: Per ASTM D 570.
    - e. Ultimate Elongation - sheet: 375%.
    - f. Modulus Elongation @ 100 psi: 1100.
    - g. Tensile Strength: 2425 psi.
- B. Backer Rod: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; maximum lengths available.
  - 1. Performance Characteristics.
    - a. Water absorption, oz/in<sup>3</sup> (g/cc): <0.017 (<0.03) per ASTM C 1016.
    - b. Density, lb/ft<sup>3</sup> (kg/m<sup>3</sup>): 1.50 - 3.0 (24-48) per ASTM D 1622.
    - c. Compression recovery, %: >90 per ASTM D 5249.
    - d. Compression deflection, psi (Kpa): >2.97 (>20.5) per ASTM D 5249.
    - e. Tensile strength, psi (Kpa): >29.0 (>200) per ASTM D 1623.
- C. Joint Filler: Closed cell expanded rubber; oversized 50 percent to joint width; self expanding; maximum lengths available.
  - 1. Performance Characteristics:
    - a. Density: 3.5 - 5.0 p.c.f. per ASTM D 1667.
    - b. Compression deflection 25%: 1.5 - 3.0 psi per ASTM D 1056.
    - c. Tensile strength: 40 psi per ASTM D 412.
    - d. Elongation: 100% per ASTM D 412.
    - e. Water absorption: 5% maximum per ASTM D 1056.

- D. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
  - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
- E. Drip Edge: Stainless steel; compatible with membrane and adhesives.
- F. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- G. Weeps:
  - 1. Type: Molded PVC grilles, insect resistant.
  - 2. Color(s): As selected by Architect from manufacturer's full range.
- H. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

## **2.06 MORTAR AND GROUT MIXING**

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match existing, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Mixing: Use mechanical batch mixer and comply with referenced standards.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### **3.02 PREPARATION**

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### **3.03 COLD AND HOT WEATHER REQUIREMENTS**

- A. Maintain materials and surrounding air temperature to minimum 40 degrees F (5 degrees C) prior to, during, and 48 hours after completion of masonry work.
- B. Maintain materials and surrounding air temperature to maximum 90 degrees F (32 degrees C) prior to, during, and 48 hours after completion of masonry work.

### **3.04 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
  - 1. Bond: Running.
  - 2. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
  - 3. Mortar Joints: Match existing.

### **3.05 PLACING AND BONDING**

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Interlock intersections and external corners.

- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

### **3.06 WEEPS/CAVITY VENTS**

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.

### **3.07 CAVITY MORTAR CONTROL**

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

### **3.08 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER**

- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).
- E. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches (400 mm) on center vertically and 24 inches (600 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.

### **3.09 MASONRY FLASHINGS**

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
  - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at nonmasonry construction.
  - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
  - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Extend metal flashings through exterior face of masonry and terminate in an angled drip with hemmed edge. Install joint sealer below drip edge to prevent moisture migration under flashing.
- C. Extend plastic and plastic flashings to within 1/4 inch (6 mm) of exterior face of masonry and adhere to top of stainless steel stainless steel angled drip with hemmed edge angled drip with hemmed edge.
- D. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

### **3.10 LINTELS**

- A. Install loose steel lintels over openings.
- B. Maintain minimum 4 inch (100 mm) bearing on each side of opening.

### **3.11 CONTROL AND EXPANSION JOINTS**

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

### **3.12 TOLERANCES**

- A. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- D. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

### **3.13 CUTTING AND FITTING**

- A. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### **3.14 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

### **3.15 CLEANING**

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

### **3.16 PROTECTION**

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION**



**SECTION 06 10 00  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Structural dimension lumber framing.
- B. Nonstructural dimension lumber framing.
- C. Rough opening framing for doors, windows, and roof openings.
- D. Sheathing.
- E. Roofing nailers.
- F. Preservative treated wood materials.
- G. Miscellaneous framing and sheathing.
- H. Communications and electrical room mounting boards.
- I. Concealed wood blocking, nailers, and supports.
- J. Miscellaneous wood nailers, furring, and grounds.

**1.02 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2022.
- D. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021a.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- F. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2018, with Errata (2019).
- G. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.
- H. PS 1 - Structural Plywood 2009 (Revised 2019).
- I. PS 20 - American Softwood Lumber Standard 2021.
- J. SPIB (GR) - Standard Grading Rules 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Southern Pine, unless otherwise indicated.

2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at [www.alsc.org](http://www.alsc.org), and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

## 2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Stud Framing (2 by 2 through 2 by 6 (50 by 50 mm through 50 by 150 mm) ):
  1. Species: Southern Pine.
  2. Grade: No. 2.
- E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  1. Lumber: S4S, No. 2 or Standard Grade.
  2. Boards: Standard or No. 3.

## 2.03 STRUCTURAL COMPOSITE LUMBER

- A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

## 2.04 CONSTRUCTION PANELS

- A. Roof Sheathing: Plywood sheathing; PS-1 or Oriented strand board sheathing; PS 2.
  1. Bond Classification: Exposure 1.
  2. Nominal Thickness: Not less than 19/32 inch (15.08 mm).
  3. Span Rating: 40/20.
- B. Wall Sheathing: Plywood; PS 1 or Oriented strand board wood structural panel; PS 2.
  1. Bond Classification: Exposure 1.
  2. Nominal Thickness: Not less than 15/32 inch (8.7 mm).
  3. Span Rating: 32/16.
- C. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch (19 mm) thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

## 2.05 ACCESSORIES

- A. Fasteners and Anchors:
  1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
  1. For contact with preservative treated wood in exposed locations, provide minimum G185 (Z550) galvanizing complying with ASTM A653/A653M.
- C. Nails, Brads, and Staples: ASTM F1667/F1667M.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction; based on ICC-ES AC70.
- E. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.
- F. Sill Gasket on Top of Foundation Wall: 1/4 inch (6 mm) thick, plate width, closed cell plastic foam from continuous rolls.

## **2.06 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
  - 1. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    - b. Treat lumber in contact with roofing, flashing, or waterproofing.
    - c. Treat lumber in contact with masonry or concrete.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches (100 mm) and seal.
- B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.
- C. Coordinate installation of rough carpentry members specified in other sections.

### **3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 FRAMING INSTALLATION**

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual, and \_\_\_\_\_.
- E. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- F. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### **3.04 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.

- C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- E. Specifically, provide blocking and framing for the proper installation of the following:
  - 1. Wall brackets.
  - 2. Grab bars.
  - 3. Towel and bath accessories.
  - 4. Wall-mounted door stops.
  - 5. Joints of rigid wall coverings that occur between studs.
  - 6. Other locations as indicated on the drawings.
- F. Provide wood ground along base of wall at floor, 1 1/2 inches tall by thickness of wallboard, continuous behind all rubber base.
  - 1. Finish face of ground shall be flush with finish face of wallboard.
  - 2. Set wallboard tight to top of ground.

### 3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
  - 1. At long edges use sheathing clips where joints occur between roof framing members.
  - 2. Nail panels to framing; staples are not permitted.
- B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
- C. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches (610 mm) on center on all edges and into studs in field of board.
  - 1. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 2. Install adjacent boards without gaps.
- D. Wall Sheathing and Roof Sheathing with Laminated Water-Resistive Barrier and Air Barrier: Secure to studs in accordance with manufacturer's installation instructions.
  - 1. Install with laminated water-resistive and air barrier on exterior side of sheathing.
  - 2. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
  - 3. Use only mechanically attached and drainable EIFS and exterior insulation with wall sheathing with laminated water-resistive and air barrier.
  - 4. Apply manufacturer's standard seam tape to joints between sheathing panels; use tape gun or hard rubber roller in accordance with manufacturer's installation instructions.

### 3.06 TOLERANCES

- A. Framing Members: 1/4 inch (6 mm) from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/4 inch in 30 feet (7 mm in 10 m) maximum.

### 3.07 CLEANING

- A. Waste Disposal: See Section 01 74 19 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
- B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION**

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**SECTION 06 17 53**  
**SHOP-FABRICATED WOOD TRUSSES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Shop-fabricated wood trusses.
- B. Truss bridging.

**1.02 REFERENCE STANDARDS**

- A. ANSI/TPI 1 - National Design Standard for Metal-Plate-Connected Wood Truss Construction 2014.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021a.
- D. SBCA (BCSI) - Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses 2018 (Updated 2020).
- E. TPI DSB-89 - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses 1989.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on plate connectors, bearing plates, and metal bracing components.
- C. Shop Drawings: Show truss configurations, sizes, spacing, size and type of plate connectors, cambers, framed openings, bearing and anchor details, and bridging and bracing. Include the following in addition to other applicable information:
  - 1. Identification of engineering software used for design.
  - 2. Building Code used for Design.
  - 3. Design loads as applicable, including:
    - a. Top Chord live load (for roof Trusses, this shall be the controlling case of live load or snow load).
    - b. Top chord dead load.
    - c. Bottom chord live load.
    - d. Bottom chord dead load.
    - e. Additional loads and locations.
    - f. Environmental Load Design Criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the Truss loads).
    - g. Lateral loads.
  - 4. Shop drawings stamped or sealed by design engineer.
  - 5. Sizes, stress grades, and species of lumber.
  - 6. Locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 7. Type, size, material, finish, design values, orientation, and location of metal connector plates.
  - 8. Splice details and bearing details.
  - 9. Slope or depth, span and spacing.
  - 10. Location of all joints and support locations.
  - 11. Number of plies if greater than one.
  - 12. Required bearing widths.
  - 13. Maximum reaction force and direction, including maximum uplift reaction forces where applicable.

14. Metal Connector Plate type, manufacturer, size, and thickness or gauge, and the dimensioned location of each Metal Connector Plate except where symmetrically located relative to the joint interface.
15. Truss-to-Truss connection and Truss field assembly requirements.
16. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and KCR (creep factor) as applicable.
17. Maximum axial tension and compression forces in the Truss members.
18. Fabrication tolerance.
19. Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used.

#### **1.04 QUALITY ASSURANCE**

- A. Designer Qualifications: Perform design by or under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
  1. Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Metal Connector Plate Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
  1. Manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for the manufacture of connector plates.
- D. Source Limitation for Connector Plates: Obtain metal connector plates from a single manufacturer.
- E. Comply with applicable requirements and recommendations of the following publications:
  1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
  2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
  3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- F. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Handle trusses in accordance with SBCA (BCSI).
  1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
  2. Protect trusses from weather by covering with waterproof sheeting and secure in place.
  3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration or damage. Discard and replace trusses that are damaged or defective.

### **PART 2 PRODUCTS**

#### **2.01 TRUSSES**

- A. Wood Trusses: Design and fabricate trusses in accordance with ANSI/TPI 1 and to achieve specified design requirements indicated.
  1. Design Loads: As indicated.
  2. Maximum Deflection under Design Loads:
    - a. Roof Trusses: Vertical deflection of 1/360 of span due to roof live, snow, or wind loads; 1/240 of span due to total combined loading.
- B. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.



- C. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

## 2.02 MATERIALS

- A. Lumber:
  - 1. DOC PS 20. Provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
    - a. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
    - b. Lumber used shall be identified by grade mark of a lumber inspection bureau or agency approved by the American Lumber Standards Committee, and shall be the size, species, and grade as shown on the Truss Design Drawings.
    - c. Provide dressed lumber, S4S.
  - 2. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
  - 3. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section Rough Carpentry.
  - 4. Adjustment of value for duration of load or conditions of use shall be in accordance with NDS.
  - 5. Lumber fabricated from old growth timber is not permitted.
- B. Steel Connectors: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) Grade 33/230, with G90/Z275 coating; die stamped with integral teeth; thickness as indicated.
  - 1. Fabricate connector plates to comply with TPI 1.
  - 2. Connector plates shall be manufactured by a Truss Plate Institute (TPI) member plate manufacturer and shall not be less than 0.036 in. thick (20 gauge) and shall meet or exceed ASTM A653/A653M grade 33.
  - 3. Galvanized coating shall meet or exceed ASTM A924/924M, coating designation G60.
- C. Truss Bridging: Type, size and spacing recommended by truss manufacturer.
- D. Fasteners:
  - 1. Provide fasteners of size and typed indicated that comply with requirements specified in this article for material and manufacture.
    - a. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
  - 2. Nails, Brads, and Staples: ASTM F1667/F1667M

## 2.03 ACCESSORIES

- A. Wood Blocking, Bridging, Plates, and Miscellaneous Framing: As specified in Section 06 10 00.
- B. Fasteners: Hot-dip galvanized steel, type to suit application.

## 2.04 FABRICATION

- A. Fabricate trusses to achieve structural requirements specified.
- B. Brace wood trusses in accordance with TPI DSB-89 and BCSI 1.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
- D. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- E. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that supports and openings are ready to receive trusses.

### **3.02 PREPARATION**

- A. Coordinate placement of bearing items.

### **3.03 ERECTION**

- A. Install trusses in accordance with manufacturer's instructions, SBCA (BCSI); maintain a copy of applicable documents on site until installation is complete.
- B. Set members level and plumb, in correct position.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure plumb, and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of truss designer.
- E. Install permanent bridging and bracing.
- F. Install headers and supports to frame openings required.
- G. Frame openings between trusses with lumber in accordance with Section 06 10 00.
- H. Coordinate placement of decking with work of this section.
- I. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.

### **3.04 TOLERANCES**

- A. Framing Members: 1/2 inch (12 mm) maximum, from true position.

**END OF SECTION**

**SECTION 07 21 00  
THERMAL INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Board insulation at perimeter foundation wall and exterior wall behind brick veneer and siding wall finish.
- B. Batt insulation in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

**1.02 REFERENCE STANDARDS**

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

**1.04 FIELD CONDITIONS**

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

**PART 2 PRODUCTS**

**2.01 APPLICATIONS**

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. Insulation Over Stud Framed Walls, Continuous (CI): Extruded polystyrene (XPS) board.
- C. Insulation in Wood Framed Walls: Batt insulation with no vapor retarder.
- D. Insulation in Wood Framed Ceiling Structure: Batt insulation with integral vapor retarder.

**2.02 FOAM BOARD INSULATION MATERIALS**

- A. Extruded Polystyrene (XPS) Continuous Insulation (CI) Board: Comply with ASTM C578, and manufactured using carbon black technology.
  - 1. Application: Continuous Insulation over Stud Framed Walls and Perimeter of Foundation
  - 2. Type and Compressive Resistance: Type X , 15 psi ( 104 kPa), minimum.
  - 3. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 4. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 5. Type and Thermal Resistance, R-value (RSI-value): Type IV, 5.6 (0.98), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
  - 6. Board Size: 48 inch by 96 inch (1220 mm by 2440 mm).
  - 7. Board Thickness:
    - a. Continuous Insulation over Stud Walls: 2", R-10 min.
    - b. Continuous Insulation at Perimeter of Foundation: 3", R-15 min.
  - 8. Board Edges: Shiplap, at long edges.

9. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.

### **2.03 MINERAL FIBER BLANKET INSULATION MATERIALS**

- A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
  1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
  2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
  4. Formaldehyde Content: Zero.
  5. Thermal Resistance: R-value (RSI-value):
    - a. Walls: R-19 (RSI 3.34).
    - b. Attic: R-38 (RSI 6.69), uncompressed.
  6. Thickness:
    - a. Walls: 5 1/2 inches (140 mm).
    - b. Attic: 12 inches (305 mm).
  7. Facing:
    - a. Walls: unfaced.
    - b. Attic: Aluminum foil, one side.

### **2.04 ACCESSORIES**

- A. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- B. Adhesive: Type recommended by insulation manufacturer for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install boards horizontally on foundation perimeter.
  1. Place boards to maximize adhesive contact.
  2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.03 BOARD INSTALLATION AT EXTERIOR WALLS**

- A. Install boards horizontally on walls.
  1. Install in running bond pattern.
  2. Butt edges and ends tightly to adjacent boards and protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Tape insulation board joints.

### **3.04 BOARD INSTALLATION AT CAVITY WALLS**

- A. Install boards to fit snugly between wall ties.
- B. Install boards horizontally on walls.
  1. Install in running bond pattern.
  2. Butt edges and ends tightly to adjacent boards and protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

- D. Place 6 inches (152 mm) wide polyethylene sheet at perimeter of wall openings, from adhesive vapor retarder bed to window and door frames, and tape seal in place to ensure continuity of vapor retarder and air seal.

### **3.05 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall and attic spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. At attic framing, place vapor retarder underside of wood truss by stapling at 6 inches (152 mm) on center. Lap and seal sheet retarder joints over face of member.
- F. Tape seal tears or cuts in vapor retarder.
- G. Extend vapor retarder tightly to full perimeter of items interrupting the plane of the membrane; tape seal in place.

### **3.06 PROTECTION**

- A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

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**SECTION 07 26 00  
UNDERSLAB VAPOR RETARDER**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Application of an underslab vapor retarder.

**1.02 REFERENCE STANDARDS**

- A. ASTM E 1745-09 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
- B. ASTM E 154-99 (2005) - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover. .
- C. ASTM E 96-05 - Standard Test Methods for Water Vapor Transmission of Materials.
- D. ASTM E 1643-09 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- E. ASTM F 1249-06 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
- F. ASTM D 1709-09 - Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method.
- G. ASTM D 1434-82(2009) - Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting.
- H. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 15 mils thick.
- I. ACI 302.2R-06 - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

**1.03 SUBMITTALS**

- A. Comply with Section 01 33 00 - Submittal Procedures.
- B. Submit manufacturer's product data and application instructions.
- C. Submit certified test reports showing compliance with specified performance characteristics and physical properties.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean dry area in accordance with manufacturer's instructions.
- C. Stack membrane on smooth ground or wood platform to eliminate warping.
- D. Protect materials during handling and application to prevent damage or contamination.
- E. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).

**1.05 ENVIRONMENTAL REQUIREMENTS**

- A. Product not intended for uses subject to abuse or permanent exposure to the elements.
- B. Do not apply on frozen ground.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Stego Industries LLC: Product - Stego Wrap 15: [www.stegoindustries.com](http://www.stegoindustries.com).
- B. W.R. Meadows: Product - Perminator 15: [www.wrmeadows.com](http://www.wrmeadows.com).
- C. Layfield Group: Product - VaporFlex 15: [www.layfieldgeosynthetics.com](http://www.layfieldgeosynthetics.com).
- D. Inteplast Group: Product - Barrier-Bac VB-350: [www.barrierbac.com](http://www.barrierbac.com).

- E. Reef Industries, Inc.: Product - Griffolyn 15 Mil: [www.reefindustries.com](http://www.reefindustries.com).
- F. Raven Industries: Product - Vaporblock VB15:[www.ravenefd.com](http://www.ravenefd.com).
- G. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 MATERIALS**

- A. Vapor Retarder membrane: Meet or exceed all requirements of ASTM E1745-09 Class A, B, and C and the following:
  - 1. Maximum Permeance ASTM E96: 0.018 Perms.
  - 2. Water Vapor Transmission Rate ASTM F1249 calibrated to ASTM E96 (water method): 0.0012 grains/ft<sup>2</sup>/hr.
  - 3. Resistance to Organisms and Substrates in Contact with Soil ASTM E154, Section 13: 0.027 Perms.
  - 4. Tensile Strength ASTM E154, Section 9: 64 LBS. Force/Inch.
  - 5. Puncture Resistance ASTM D1709, Method B: 2,200 Grams minimum.
  - 6. Water Vapor Retarder ASTM E1745: 0.007 perms minimum - Meets or exceeds Class A, B and C.
  - 7. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils.

## **2.03 ACCESSORIES**

- A. Seam Tape:
  - 1. High Density Polyethylene Tape with pressure sensitive adhesive.
    - a. Width: 4 inches (101.6 mm) minimum.
- B. Pipe Boots:
  - 1. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.
- C. Pointing Mastic:
  - 1. Pre-mixed, cold applied, polymeric single component sealing compound.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### **3.02 SURFACE PREPARATION**

- A. Prepare surfaces in accordance with manufacturers instructions.
- B. Verify that base material is approved by Architect or Geotechnical Engineer and is level and compacted.

### **3.03 APPLICATION**

- A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-10.
- B. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
- C. Lap vapor barrier over footings and seal to foundation walls.
- D. Overlap joints 6 inches and seal with manufacturer's tape.
- E. Seal all penetrations (including pipes) with manufacturer's pipe boot.
- F. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
- G. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

**END OF SECTION**



**SECTION 07 27 00  
AIR BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air barriers.

**1.02 DEFINITIONS**

- A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

**1.03 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.
- C. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.

**PART 2 PRODUCTS**

**2.01 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR PERMEABLE)**

- A. Air Barrier Sheet, Mechanically Fastened:
  - 1. Air Permeance: 0.004 cfm/sq ft (0.02 L/(s sq m)), maximum, when tested in accordance with ASTM E2178.
  - 2. Water Vapor Permeance: 10 perms (574 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F (23 degrees C).
  - 3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
  - 4. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, Class A, when tested in accordance with ASTM E84.
  - 5. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2-1/2 inches (64 mm) wide, compatible with sheet material; unless otherwise indicated.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that surfaces and conditions are ready for work of this section.
- B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- C. Do not proceed with this work until unsatisfactory conditions have been corrected.

**3.02 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

**3.03 INSTALLATION**

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

- D. Mechanically Fastened Sheets - On Exterior:
  - 1. Install sheets shingle fashion to shed water, with seams generally horizontal.
  - 2. Overlap seams as recommended by manufacturer, 6 inches (152 mm), minimum.
  - 3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches (305 mm), minimum.
  - 4. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
  - 5. Install air barrier underneath jamb flashings.
  - 6. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.
- E. Openings and Penetrations in Exterior Air Barriers:
  - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto air barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
  - 2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches (100 mm) wide; do not seal sill flange.
  - 3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches (230 mm) wide, and covering entire depth of framing.
  - 4. At head of openings, install flashing under air barrier extending at least 2 inches (50 mm) beyond face of jambs; seal air barrier to flashing.
  - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
  - 6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

### **3.04 PROTECTION**

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

**END OF SECTION**

**SECTION 07 31 13  
ASPHALT SHINGLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection and underlayment.
- C. Metal flashing.

**1.02 REFERENCE STANDARDS**

- A. ASTM D225 - Standard Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules 2007.
- B. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing 2017.
- C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- D. ASTM D3161/D3161M - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method) 2020.
- E. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules 2019.
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- G. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing 2016a (Reapproved 2021).
- H. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings 2020a.
- I. ASTM F1667/F1667M - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021a.
- J. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.
- D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern ; for color selection.
- E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements for additional provisions.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
- B. Installer Qualifications: Installer must be approved for installation of all roofing products to be installed under this section.

### 1.05 FIELD CONDITIONS

- A. Do not install shingles, eave protection membrane or underlayment when surface, ambient air, or wind chill temperatures are below 45 degrees F (7 degrees C).
- B. Proceed with work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations.

### 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Provide lifetime manufacturer's warranty for coverage against black streaks caused by algae.
- C. Provide 15 -year manufacturer's warranty for wind damage.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Algae Resistant Asphalt Shingles:
  - 1. Atlas Roofing Corporation; Storm Master Shake High Wind and Impact Resistant Shingles: [www.atlasroofing.com/#sle](http://www.atlasroofing.com/#sle).
  - 2. Certainteed Roofing; Landmark Premium AR - Algae Resistant Shingles: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 3. GAF; Timberline HDZ with Stainguard Plus Algae Protection: [www.gaf.com/#sle](http://www.gaf.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 ASPHALT SHINGLES

- A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
  - 1. Fire Resistance: Class A, complying with ASTM E108.
  - 2. Wind Resistance: Class A, when tested in accordance with ASTM D3161/D3161M.
  - 3. Warranted Wind Speed: Not greater than 150 mph (241 km/h).
  - 4. Algae resistant.
  - 5. Color: As selected by Architect.

### 2.03 SHEET MATERIALS

- A. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 22 mil (0.55 mm) total thickness; with strippable release film and woven polypropylene sheet top surface.

### 2.04 METAL FLASHING

- A. Metal Flashings: Provide sheet metal eave edge and other flashing as indicated.
  - 1. Form flashings to profiles indicated on drawings.
  - 2. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance.
  - 3. Hem exposed edges of flashings minimum 1/4 inch (6 mm) on underside.

### 2.05 ACCESSORIES

- A. Roofing Nails: Standard round wire shingle type, galvanized steel, stainless steel, aluminum roofing nails, or copper roofing nails, minimum 3/8-inch (9.5 mm) head diameter, 12-gauge, 0.109-inch (2.77 mm) nail shank diameter, 1-1/2 inches (38 mm) long and complying with ASTM F1667/F1667M.
- B. Ridge Vents: Plastic, extruded with vent openings that do not permit direct water or weather entry; flanged to receive shingles .

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify existing conditions prior to starting this work.
- B. Verify that roof deck is of sufficient thickness to accept fasteners.

- C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- D. Verify roof openings are correctly framed.
- E. Verify deck surfaces are dry, free of ridges, warps, or voids.
- F. Do not begin installation until the roof deck has been properly prepared.
- G. If roof deck preparation is the responsibility of another installer, notify the architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

- A. Seal roof deck joints wider than 1/16 inch (1.5 mm) as recommended by shingle manufacturer.
- B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.
- C. Broom clean deck surfaces before installing underlayment or eave protection.
- D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches (50 mm) and seal with roof cement, and secure flange with nails spaced 12 inches (300 mm) on center.

### 3.03 INSTALLATION

- A. Eave Protection Membrane:
  - 1. Install eave protection membrane from eave edge to minimum 24 inches (610 mm) up-slope beyond interior face of exterior wall.
- B. Underlayment:
  - 1. Roof Slopes Greater Than 4:12: Install underlayment perpendicular to slope of roof, with ends and edges weather lapped minimum 4 inches (100 mm); stagger end laps of each consecutive layer, nail in place, and weather lap minimum 4 inches (100 mm) over eave protection.
  - 2. Weather lap and seal watertight with plastic cement any items projecting through or mounted on roof.
- C. Metal Flashing:
  - 1. Install flashings in accordance with manufacturer's instructions.
  - 2. Weather lap joints minimum 2 inches (50 mm) and seal weather tight with plastic cement.
  - 3. Secure in place with nails at 12" inches (304.8 mm) on center, and conceal fastenings.
  - 4. Items Projecting Through or Mounted on Roofing: Flash and seal weather tight with plastic cement.
- D. Shingles:
  - 1. Install shingles in accordance with manufacturer's instructions.
    - a. Fasten individual shingles using two nails per shingle, or as required by manufacturer and local building code, whichever is greater.
    - b. Fasten strip shingles using four nails per strip, or as required by manufacturer and local building code, whichever is greater.
  - 2. Place shingles in straight coursing pattern with 5-inch (125 mm) weather exposure to produce double thickness over full roof area, and provide double course of shingles at eaves.
  - 3. Project first course of shingles 3/4 inch (19 mm) beyond fascia boards.
  - 4. Extend shingles 1/2 inch (13 mm) beyond face of gable edge fascia boards.
  - 5. Complete installation to provide weathertight service.

### 3.04 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean exposed work upon completion of installation; remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to finish.

### 3.05 PROTECTION

- A. Do not permit traffic over finished roof surface; protect roofing until completion of project.

- B. Any roof areas that are not completed by the end of the workday are to be protected from moisture and contaminants.

**END OF SECTION**

**SECTION 07 46 46  
FIBER-CEMENT SIDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiber cement vented soffit board.

**1.02 REFERENCE STANDARDS**

- A. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1998.
- B. ASTM C 1185 - Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards; 1999.
- C. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets 2022.
- D. ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test, Tool and Tape.
- E. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction; 1998.
- F. ASTM E 84 -- Standard Test Method for Surface Burning Characteristics of Building Materials; 1999.
- G. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials; 1995.
- H. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 1999.
- I. ASTM E 228 - Standard Test Method for Linear Thermal Expansion of Solid Materials With a Vitreous Silica Dilatometer; 1995.
- J. ASTM G 26 - Standard Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials; 1996.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
  - 1. Manufacturer's requirements for related materials to be installed by others.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods, including nail patterns.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, \_\_\_\_\_, and methods of anchorage.
- D. Maintenance Instructions: Periodic inspection recommendations and maintenance procedures.
- E. Shop Drawings: Provide detailed drawings of atypical non-standard applications of cementitious siding materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- F. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, two samples, minimum size 4 by 6 inches (100 by 150 mm), representing actual product, color, and patterns.

**1.04 WARRANTY**

- A. Submit copy of manufacturer's warranty, made out in Owner's name, showing that it has been registered with manufacturer.
- B. Product Warranty: Limited, non-pro-rated product warranty.
  - 1. Lap siding - 30 years.
  - 2. Soffit panels - 30 years.
- C. Workmanship Warranty: Application limited warranty for 2 years.

## 1.05 QUALITY ASSURANCE

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Deliver and store materials in manufacturer's unopened packaging, with labels intact, until ready for installation.
- C. Store materials under dry and waterproof cover, well ventilated, and elevated above grade on a flat surface.
- D. Store products in manufacturer's unopened packaging until ready for installation.
- E. Store siding on edge or lay flat on a smooth level surface. Protect edges and corners from chipping. Store sheets under cover and keep dry prior to installing.
- F. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

### 1.07 PROJECT CONDITIONS

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

## PART 2 PRODUCTS

### 2.01 MATERIALS - SIDING

- A. Lap Siding: Individual horizontal boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
  - 1. Style: Standard lap style.
  - 2. Texture: Simulated cedar grain.
  - 3. Length: 12 feet (3.7 m), nominal.
  - 4. Width (Height): 6-1/4 inches (159 mm).
  - 5. Thickness: 5/16 inch (8 mm), nominal.
  - 6. Finish: Factory applied topcoat.
  - 7. Color: As selected by Architect from manufacturers full range of available colors.
  - 8. Warranty: 30 year limited; transferable.
  - 9. Products:
    - a. Allura, a division of Plycem USA, Inc; \_\_\_\_\_ ; Allura Lap Siding: [www.allurausa.com/#sle](http://www.allurausa.com/#sle).
    - b. James Hardie Building Products, Inc; \_\_\_\_\_ ; Hardie Plank: [www.jameshardie.com/#sle](http://www.jameshardie.com/#sle).
    - c. Nichiha USA, Inc; \_\_\_\_\_ : [www.nichiha.com/#sle](http://www.nichiha.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Soffit Panels: Panels made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.
  - 1. Texture: Smooth.
  - 2. Ventilation: Vented.
  - 3. Length: 144 inches (3657.6 mm), nominal.
  - 4. Width: 24 inches (610 mm).
  - 5. Thickness: 1/4 inch (6.35 mm), nominal.
  - 6. Finish: Factory applied topcoat.
  - 7. Color: As selected by Architect from manufacturers full range of available colors.
  - 8. Manufacturer: Same as siding.

### 2.02 ACCESSORIES

- A. Furring Strips: Wood, size as indicated on plans.
- B. Trim: Same material and texture as siding.



## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and recommendations.
  - 1. Read warranty and comply with terms necessary to maintain warranty coverage.
  - 2. Use trim details as indicated on drawings.
  - 3. Touch up field cut edges before installing.
  - 4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood Trusses without Sheathing: Install soffit board fastened into studs.
- C. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- D. Install block framing between wood trusses where soffit panel horizontal joints occur.
- E. Place fasteners no closer than 3/8 inch (9.5 mm) from panel edges and 2 inches (51 mm) from panel corners.
- F. Allow minimum vertical clearance between the edge of paneling and any other material in strict accordance with the manufacturer's installation instructions.
- G. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
- H. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- I. Do not install siding less than 6 inches (152 mm) from ground surface, or closer than 1 inch (25.4 mm) to roofs, patios, porches, and other surfaces where water may collect.
- J. After installation, seal joints; seal around penetrations, and paint exposed cut edges.
- K. Finish Painting: See Section 09 91 13.

### **3.02 PROTECTION**

- A. Protect installed products until Date of Final Completion.
- B. Touch-up, repair or replace damaged products before Final Acceptance.

**END OF SECTION**

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**SECTION 07 62 00**  
**SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings and counterflashings and other items indicated.
- B. Sealants for joints within sheet metal fabrications.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- D. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- E. CDA A4050 - Copper in Architecture - Handbook current edition.
- F. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 12 inch (300 mm) in size illustrating metal finish color.

**1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

**PART 2 PRODUCTS**

**2.01 SHEET MATERIALS**

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch (0.61 mm) thick base metal.
- B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 0.040 inch (1.0 mm) thick; plain finish shop pre-coated with fluoropolymer coating.
  - 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As selected by Architect from manufacturer's full range of colors.

**2.02 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18-inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

### **2.03 ACCESSORIES**

- A. Primer Type: Zinc chromate.
- B. Concealed Sealants: Non-curing butyl sealant.
- C. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- D. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.38 mm).

### **3.03 INSTALLATION**

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

**END OF SECTION**

**SECTION 07 65 23**  
**EPDM THROUGH-WALL FLASHING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. EPDM through-wall flashing and accessory products.
- B. Materials and installation methods for EPDM through-wall flashing assemblies as indicated on drawings.
- C. Through-wall flashing and accessories for installation in cavity wall construction in the following locations:
  - 1. Wall bases.
  - 2. Window sills.
  - 3. Heads of openings.
  - 4. Shelf angles.
  - 5. Tops of walls.
  - 6. Above projections.
  - 7. At other discontinuities in the cavity.

**1.02 PRODUCTS INSTALLED BUT NOT SUPPLIED UNDER THIS SECTION**

- A. Masonry cavity drainage products, weeps, mortar drip screen and drip plate provided in Section 04 20 00 - Unit Masonry.

**1.03 REFERENCE STANDARDS**

- A. ASTM D 412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
- B. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.
- C. ASTM D 746 Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
- D. ASTM D 624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
- E. ASTM D 741 Methods of Measuring Dimensions of Rigid Rods Used in Electrical Insulation
- F. ASTM D 4637 Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane
- G. ASTM D 1149 Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber

**1.04 SUBMITTALS**

- A. Provide in accordance with Section 01 30 00 - Administrative Requirements.
- B. Shop drawings showing locations of through-wall flashing and details of all typical conditions.
- C. Manufacturer's technical data sheets and material safety data sheets for Product and Accessories.
- D. Manufacturer's installation instructions.
- E. Manufacturer's documentation of volatile organic compounds (VOC) content Product and Accessories.
- F. Certification of compatibility by Manufacturer, listing all materials on the Project with which the Product and Accessories may come into contact.
- G. Samples of through-wall flashing minimum 6 inch by 6 inch size.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Installer shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.
- B. Single-Source Responsibility: Obtain Product and Accessories from single manufacturer.

- C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs ).
- D. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed Product unless it has been inspected, tested and approved.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by Manufacturer.
- C. Protect stored materials from direct sunlight.
- D. Avoid spillage. Immediately notify Architect if spillage occurs and start clean up procedures. Clean spills and leave area as it was prior to spill.

#### **1.07 WASTE MANAGEMENT AND DISPOSAL**

- A. Place materials defined as hazardous or toxic waste in designated containers.
- B. Ensure emptied containers are stored safely for disposal away from children.

#### **1.08 PROJECT CONDITIONS**

- A. Applicator shall have full, safe access to area.
- B. Apply Product and Accessories within temperature ranges indicated in Manufacturer's literature.

#### **1.09 WARRANTIES**

- A. Provide the Manufacturer's minimum five year material warranty.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURER**

- A. Carlisle Coatings & Waterproofing, Incorporated: [www.carlisle-ccw.com](http://www.carlisle-ccw.com).
  - 1. Basis of Design or approved substitution.
- B. Hohmann & Barnard, Inc.: [www.h-b.com](http://www.h-b.com).
- C. Heckman Building Products, Inc.: [www.heckmanbuildingproducts.com](http://www.heckmanbuildingproducts.com).
- D. Wire-bond: [www.wirebond.com](http://www.wirebond.com).
- E. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Provide a membrane constructed to perform as a through-wall flashing durably integrated with the wall assemblies water resistive barrier and cavity drainage system. The installed through-wall flashing shall perform as a liquid water drainage plane to discharge incidental condensation or water penetration to the exterior through the cavity drainage system.
- B. Provide a water proof EPDM membrane through-wall flashing of minimum 0.040 inch (40 mils) thickness consisting of cured, dimensionally-stable, non-reinforced EPDM with talc removed from surfaces. It shall meet the following requirements:
  - 1. Tensile Strength: Not less than 1,600 psi, ASTM D 412.
  - 2. Tensile Elongation: Not less than 500 percent, ASTM D 412.
  - 3. Brittleness Temperature: Not more than minus 65 degrees F, ASTM D 746.
  - 4. Tear Resistance: Not less than 200 lbf, ASTM D 624, Die C.
  - 5. Resistance to Water: Not more 2 percent volume change after 7 days immersion at 158 degrees F, ASTM D 741.
  - 6. Water Vapor Permeance: Not more than 0.06 Perm, ASTM E-96, Method B.
  - 7. Resistance to UV: No cracks, ASTM D 4637.
  - 8. Ozone Resistance: No cracks, ASTM D 1149.
- C. Product: Carlisle Pre-Kleened EPDM Thru-Wall Flashing or approved substitution.

### **2.03 ACCESSORIES**

- A. Basis of Design by Carlisle Coatings & Waterproofing, Incorporated or approved substitution.
  - 1. Splice Tape: SURE-SEAL™ SecurTape or equal by manufacturer.
  - 2. Splice Compound: SURE-SEAL™ In-Seam Sealant or equal by manufacturer.
  - 3. Splice Tape Primer: SURE-SEAL™ HP 250 Primer or equal by manufacturer.
  - 4. Splice Cleaner: Per manufacturer.
  - 5. Bonding Adhesive: Water-based : SURE-SEAL™ Aqua Base 120 or equal by manufacturer.
  - 6. Corners: Formed pre-manufactured Inside/Outside Corners.
  - 7. Lap Sealant: SURE-SEAL™ Lap Sealant or equal by manufacturer.
  - 8. Termination Bar: SURE-SEAL™ Termination Bar or equal by manufacturer.
  - 9. Mastic: SURE-SEAL™ Water Cutoff Mastic or equal by manufacturer.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Apply Product and Accessories according to Manufacturer's instructions and drawings.
- B. Apply Product to sound substrate. Do not apply over mechanically-attached water resistive barrier such as felt, paper or house wrap.
- C. Adhere, fasten or cast in place vertical termination of Product according to Manufacturer's instructions and drawings.
- D. Form watertight splices between neighboring pieces of Product using Splice Tape or Splice Compound, according to instructions in Manufacturer's literature.
- E. Install Product with kick-out at flat pitch, or preferably sloped to provide drainage to the exterior. Surfaces shall not be oriented so that water can pond on the through-wall flashing

#### **3.02 SCHEDULE**

- A. Install Product during or after construction of back-up wall.
- B. Install Product before or during installation of brick veneer.
- C. Lap water resistive barrier over vertical termination of Product on back-up wall. Lap and secure water resistive barrier according to water resistive barrier manufacturer's instructions and drawings.
- D. Integrate Product with adhered membrane air barrier, damp proofing or water-resistive barrier on back-up wall according to Manufacturer's instructions and drawings.

#### **3.03 REPAIR AND PROTECTION**

- A. Protect Product from damage during application and remainder of construction period.
- B. Inspect before covering and make repairs as necessary. Remove and replace damaged material.

**END OF SECTION**

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**SECTION 07 71 23  
MANUFACTURED GUTTERS AND DOWNSPOUTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pre-finished aluminum gutters and downspouts.
- B. Precast concrete splash pads.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.
- B. Comply with applicable code for size and method of rain water discharge.
- C. Maintain one copy of each document on site.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
- C. Samples: Submit two samples, 6 inch (150 mm) long illustrating component design, finish, color, and configuration.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Gutters: Pre-Finished Aluminum Sheet, ASTM B209 (ASTM B209M); 0.50 inch thick.
- B. Downspouts: Pre-Finished Aluminum Sheet, ASTM B209 (ASTM B209M); 0.040 inch (1.0mm) thick.

**2.02 COMPONENTS**

- A. Gutters: Profile as indicated on plans, contemporary profile when not indicated.
- B. Downspouts: SMACNA Rectangular profile - smooth, size as indicated on plans.
  - 1. Elbows: Shop fabricated, seamed and made watertight.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
  - 1. Anchoring Devices: In accordance with CDA requirements.
  - 2. Gutter Supports: Brackets.
  - 3. Downspout Supports: Brackets.
- D. Fasteners: Galvanized steel, with soft neoprene washers.

**2.03 FINISHES**

- A. Fluoropolymer Coating: Superior Performance Organic Finish, AAMA 2605, multiple coat, thermally cured fluoropolymer finish system; color as selected by architect from manufacturer's full line of colors.

- B. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

#### **2.04 ACCESSORIES**

- A. Splash Pads: Precast concrete type, profiles size(s) as indicated; minimum 3,000 psi (21 MPa) compressive strength at 28 days, with minimum 5 percent air entrainment.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

#### **3.02 PREPARATION**

- A. Paint concealed sheet metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch (0.381 mm).

#### **3.03 INSTALLATION**

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/2" maximum per 40 feet .

**END OF SECTION**

## **SECTION 07 92 00 JOINT SEALANTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

#### **1.02 REFERENCE STANDARDS**

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C834 - Standard Specification for Latex Sealants 2017.
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- G. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

#### **1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
  - 5. Substrates for which use of primer is required.
  - 6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
  - 7. Sample product warranty.
  - 8. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- F. Executed warranty.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

## 1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Final Acceptance.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Nonsag Sealants:
  - 1. Adhesives Technology Corporation: [www.atcepoxy.com/#sle](http://www.atcepoxy.com/#sle).
  - 2. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  - 3. Dow: [www.dow.com/#sle](http://www.dow.com/#sle).
  - 4. Henry Company: [www.henry.com/#sle](http://www.henry.com/#sle).
  - 5. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
  - 6. Momentive Performance Materials, Inc (formerly GE Silicones): [www.momentive.com/#sle](http://www.momentive.com/#sle).
  - 7. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - 8. Sika Corporation: [www.usa.sika.com/#sle](http://www.usa.sika.com/#sle).
  - 9. Specified Technologies Inc: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
  - 10. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 11. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 12. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Self-Leveling Sealants:
  - 1. Adhesives Technology Corporation: [www.atcepoxy.com/#sle](http://www.atcepoxy.com/#sle).
  - 2. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
  - 3. Dow: [www.dow.com/#sle](http://www.dow.com/#sle).
  - 4. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - 5. Sika Corporation: [www.usa.sika.com/#sle](http://www.usa.sika.com/#sle).
  - 6. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  - 7. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - 8. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 JOINT SEALANT APPLICATIONS

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
      - 1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.

- 2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated.
- c. Other joints indicated below.
3. Do not seal the following types of joints:
  - a. Intentional weep holes in masonry.
  - b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
  - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - d. Joints where installation of sealant is specified in another section.
  - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Wet Areas: Bathrooms and restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.
- D. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

### **2.03 JOINT SEALANTS - GENERAL**

- A. Colors: As selected by Architect from manufacturer's full range.

### **2.04 NONSAG JOINT SEALANTS**

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  1. Movement Capability: Plus and minus 50 percent, minimum.
  2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
  3. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  4. Color: To be selected by Architect from manufacturer's full range.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  1. Color: White.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
  1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's full range.
- D. Non-Sag "Traffic-Grade" Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
  1. Color: To be selected by Architect from manufacturer's full range.
- E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
  1. Color: To be selected by Architect from manufacturer's full range.
  2. Grade: ASTM C834; Grade - NF.

### **2.05 SELF-LEVELING JOINT SEALANTS**

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  1. Color: Gray.

### **2.06 ACCESSORIES**

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant

manufacturers for specific application.

1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

#### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

#### **3.03 INSTALLATION**

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

**END OF SECTION**

**SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Thermally insulated hollow metal doors with frames.
- D. Hollow metal borrowed lites glazing frames.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.
- C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames 2019.
- D. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2018.
- E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2020.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- H. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2023.
- J. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- P. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.
- R. UL 10B - Standard for Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- S. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Samples: Submit two samples of metal, 2 by 2 inches (51 by 51 mm) in size, showing factory finishes, colors, and surface texture.
- E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- F. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
  - 1. Provide hollow metal frames from SDI Certified manufacturer.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

#### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.
- C. Doors and frames must be properly marked with door opening mark number to correspond with the schedule.
- D. Deliver all steel doors with corrugated edge protection and palletized to provide protection during transit and job storage.
- E. Inspect doors and frames upon delivery for damage. Minor damage is to be repaired, provided the repair is equal to new work and acceptable to the architect.
- F. Store doors and frames at the job site under cover. Place units on wood sills on the floor in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If the wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4 inch space between stacked doors to promote air circulation.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
- B. Mesker, dormakaba Group; FDJ Series Drywall Frames: [www.meskeropeningsgroup.com/#sle](http://www.meskeropeningsgroup.com/#sle).
- C. Republic Doors, an Allegion brand: [www.republicdoor.com/#sle](http://www.republicdoor.com/#sle).
  - 1. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
  - 4. Door Edge Profile: Manufacturers standard for application indicated.



5. Typical Door Face Sheets: Flush.
  6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
  7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### **2.03 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
  3. Door Thermal Resistance: R-Value of 8.7, minimum, for installed thickness of polyurethane.
  4. Weatherstripping: Refer to Section 08 71 00.

### **2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Exterior Door Frames: Full profile/continuously welded type.
1. Frame Metal Thickness: 14 gage, 0.067 inch (1.7 mm), minimum.
  2. Frame Finish: Factory primed and field finished.
  3. Weatherstripping: Separate, see Section 08 71 00.
- C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
1. Frame Metal Thickness: 16 gauge, 0.053 inch (1.3 mm), minimum.
  2. Frame Finish: Factory primed and field finished.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- E. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- F. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

### **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

### **2.06 ACCESSORIES**

- A. Glazing: As specified in Section 08 80 00, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered corners; prepared for countersink style tamper proof screws.

- C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

#### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

#### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Install door hardware as specified in Section 08 71 00.
- D. Comply with glazing installation requirements of Section 08 80 00.
- E. Coordinate installation of electrical connections to electrical hardware items.
- F. Touch up damaged factory finishes.

#### **3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

#### **3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.
- B. Final Adjustments: Adjust operating doors and hardware items just prior to final inspection and acceptance by the Owner and Architect. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are damaged, bowed or otherwise unacceptable.
- C. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

#### **3.06 PROTECTION**

- A. Provide protective measures required throughout the construction period to ensure that door and frame units will be without damage or deterioration, other than normal weathering, at time of acceptance.

**END OF SECTION**

**SECTION 08 36 13  
SECTIONAL DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.

**1.02 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- D. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- E. DASMA 102 - American National Standard Specifications for Sectional Doors 2018.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- G. NEMA MG 1 - Motors and Generators 2021.
- H. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Samples: Two panel finish samples, 12 by 12 inch (300 by 300 mm) in size, illustrating color and finish.
- E. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.
- F. Operation Data: Include normal operation, troubleshooting, and adjusting.
- G. Maintenance Data: Include data for transmission, shaft and gearing, lubrication frequency, spare part sources.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Comply with applicable code for motor and motor control requirements.
- D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for purpose specified.
- E. Submit manufacturer's certificate that products meet or exceed specified requirements.

### **1.05 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Final Acceptance.
- C. Manufacturer Warranty: Provide 5-year manufacturer warranty for electric operating equipment. Complete forms in Owner's name and register with manufacturer.
- D. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.

### **1.06 DELIVERY, STORAGE & HANDLING**

- A. Comply with Division 1 Product Requirements Section.
- B. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. C.H.I. Overhead Doors: [www.chiohd.com/#sle](http://www.chiohd.com/#sle).
- B. Clopay Building Products: [www.clopaydoor.com/#sle](http://www.clopaydoor.com/#sle).
- C. Raynor Garage Doors; Basis of Design: TM Series, Model TM220: [www.raynor.com/#sle](http://www.raynor.com/#sle).
- D. Wayne-Dalton, a Division of Overhead Door Corporation: [www.wayne-dalton.com/#sle](http://www.wayne-dalton.com/#sle).
- E. Overhead Door: [www.overheaddoor.com](http://www.overheaddoor.com).
- F. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.

### **2.03 STEEL DOORS**

- A. Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Door Panels: Steel construction; outer steel sheet of 20 gauge, 0.0359 inch (0.91 mm) minimum thickness, pencil grooved profile; inner steel sheet of 26 gauge, 0.0179 inch (.46 mm) minimum thickness, flat profile; core reinforcement sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
  - 2. Door Nominal Thickness: 2 inches (51 mm) thick.
  - 3. Exterior Finish:
    - a. Factory finished with acrylic baked enamel; custom color as selected by architect.
  - 4. Interior Finish:
    - a. Factory finished with acrylic baked enamel; color as selected from manufacturers standard line.

### **2.04 COMPONENTS**

- A. Track: Rolled galvanized steel, 0.090 inch (2.3 mm) minimum thickness; 3 inch (75 mm) wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch (6 mm) thick.
- B. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.

- C. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- D. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.
- E. Head Weatherstripping: EPDM rubber seal, one piece full length.
- F. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- G. Lock: Inside side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior and exterior handle.
- H. Lock Cylinders: Master keyed to building keying system.

## 2.05 MATERIALS

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

## 2.06 ELECTRIC OPERATION

- A. Electric Operators:
  - 1. Mounting: Side mounted on cross head shaft.
  - 2. Motor Enclosure:
    - a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.
  - 3. Motor Rating: 1/3 hp (250 W); continuous duty.
  - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
  - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  - 6. Controller Enclosure: NEMA 250, Type 1.
  - 7. Opening Speed: 12 inches per second (300 mm/s).
  - 8. Brake: Adjustable friction clutch type, activated by motor controller.
  - 9. Manual override in case of power failure.
  - 10. See Section 26 05 83 for electrical connections.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- C. Control Station: Provide standard push-button momentary-contact control device for each operator complying with UL 325.
  - 1. 24 volt circuit.
  - 2. Surface mounted, at interior, adjacent to man door.
  - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

- C. Do not proceed with installation of doors, operators, controls and accessories until unacceptable conditions are corrected.

### **3.02 PREPARATION**

- A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.
- B. Apply primer to wood frame.

### **3.03 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
- F. Install perimeter trim.

### **3.04 TOLERANCES**

- A. Maximum Variation from Plumb: 1/16 inch (1.5 mm).
- B. Maximum Variation from Level: 1/16 inch (1.5 mm).
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch (3 mm) from 10 ft (3 m) straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

### **3.05 ADJUSTING**

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

### **3.06 CLEANING**

- A. Clean doors and frames.
- B. Remove temporary labels and visible markings.

### **3.07 PROTECTION**

- A. Protect installed products from damage until Date of Final Acceptance.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**

**SECTION 08 43 13**  
**ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

**1.02 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- G. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
  - 1. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- D. Samples: Submit two samples 6x6 inches (150x150 mm) in size illustrating finished aluminum surface, glass, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

- H. Manufacturer's qualification statement.
- I. Installer's qualification statement.

#### **1.05 QUALITY ASSURANCE**

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
- D. Source Limitations: Obtain aluminum framed storefront system through one source from a single manufacturer.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

#### **1.07 FIELD CONDITIONS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.
- B. Field Measurements: Verify actual dimensions of aluminum framed storefront openings by field measurements before fabrication and indicate field measurements on Shop Drawings.

#### **1.08 WARRANTY**

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Final Acceptance.
- C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Aluminum-Framed Storefronts:
  - 1. Kawneer North America: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
    - a. Product - Exterior Storefront: Trifab VG451T, Basis of Design or approved substitution.
    - b. Product - Doors: 350 Medium Stile, Basis of Design or approved substitution.
  - 2. Manko Window Systems, Inc: [www.mankowindows.com/#sle](http://www.mankowindows.com/#sle).
  - 3. Oldcastle BuildingEnvelope: [www.oldcastlebe.com/#sle](http://www.oldcastlebe.com/#sle).
  - 4. Tubelite, Inc: [www.tubeliteinc.com/#sle](http://www.tubeliteinc.com/#sle).
  - 5. YKK AP America, Inc: [www.ykkap.com/commercial/#sle](http://www.ykkap.com/commercial/#sle).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 ALUMINUM-FRAMED STOREFRONT**

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
  - 2. Glazing Position: Front-set.
  - 3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep (50 mm wide by 114 mm deep).



4. Finish: Class I color anodized.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
  5. Finish Color: Dark bronze.
  6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
  7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
  9. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  10. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
- B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.

### 2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Glazing Stops: Flush.
  2. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
- B. Glazing: See Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
1. Thickness: 1-3/4 inches (43 mm).
  2. Top Rail: 3-1/2 inches (88.9 mm) wide.
  3. Vertical Stiles: {CH#51616} wide.
  4. Bottom Rail: 10 inches (254 mm) wide.
  5. Glazing Stops: Beveled.
  6. Finish: Same as storefront.

### 2.04 MATERIALS - STOREFRONT

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209/B209M.
- C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
- D. Fasteners: Stainless steel.
- E. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
- F. Concealed Flashings: Galvanized steel, 26 gauge, 0.0179 inch (0.45 mm) minimum base metal thickness.
- G. Sealant for Setting Thresholds: Non-curing butyl type.

- H. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- I. Glazing Accessories: See Section 08 80 00.
- J. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

## **2.05 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Dark bronze.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

## **2.06 HARDWARE**

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: See Section 08 71 00.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all exterior doors.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

### **3.02 INSTALLATION**

- A. Install system in accordance with manufacturer's instructions.
  - 1. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum storefront, swing entrance doors, hardware, accessories, and other components.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
  - 1. Set sill threshold in bed of sealant for weather tight construction.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install glass and infill panels using glazing method required to achieve performance criteria; see Section 08 80 00.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### **3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

### **3.04 ADJUSTING**

- A. Adjust operating hardware and sash for smooth operation.

### **3.05 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.
- D. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove non-permanent labels, and clean surfaces.

### **3.06 PROTECTION**

- A. Protect installed products from damage until Date of Final Acceptance.

**END OF SECTION**

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## SECTION 08 71 00 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

#### 1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

- B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Automatic operators.
4. Cylinders specified for doors in other sections.

- C. Related Sections:

1. Division 06 Section "Rough Carpentry".
2. Division 08 Section "Hollow Metal Doors and Frames".
3. Division 08 Section "Stainless Steel Doors and Frames".
4. Division 08 Section "Flush Wood Doors".
5. Division 08 Section "Clad Wood Doors".
6. Division 08 Section "Stile and Rail Wood Doors".
7. Division 08 Section "Fiberglass Doors".
8. Division 08 Section "Bullet Resistant Doors and Frame".
9. Division 08 Section "Cold Storage Doors".
10. Division 08 Section "Radio-Frequency Interference Shielding Doors".
11. Division 08 Section "Radiation Shielding Doors and Frames".
12. Division 08 Section "Attack Resistant Doors and Frames."
13. Division 08 Section "Forced Entry Doors and Frames".
14. Division 08 Section "Sound Control Hollow Metal Door Assemblies".
15. Division 08 Section "Sound Control Wood Door Assemblies".
16. Division 08 Section "Aluminum-Framed Entrances and Storefronts".
17. Division 28 Section "Access Control Hardware Devices".
18. Division 28 Section "Campus Access Control Hardware Devices".
19. Division 28 Section "Multi-Family Access Control".

- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
  2. ICC/IBC - International Building Code.
  3. NFPA 70 - National Electrical Code.
  4. NFPA 80 - Fire Doors and Windows.
  5. NFPA 101 - Life Safety Code.
  6. NFPA 105 - Installation of Smoke Door Assemblies.
  7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
  2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
  3. ANSI/UL 294 - Access Control System Units.
  4. UL 305 - Panic Hardware.
  5. ANSI/UL 437- Key Locks.

### 1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
  2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each door hardware item.
    - b. Manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.

- e. Explanation of abbreviations, symbols, and codes contained in schedule.
  - f. Mounting locations for door hardware.
  - g. Door and frame sizes and materials.
  - h. Warranty information for each product.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Informational Submittals:
- 1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- 1.4 QUALITY ASSURANCE
- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
  - B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
  - C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
  - D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing

facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
  - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
  - 1. Function of building, purpose of each area and degree of security required.
  - 2. Plans for existing and future key system expansion.
  - 3. Requirements for key control storage and software.
  - 4. Installation of permanent keys, cylinder cores and software.
  - 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
  - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
  - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
  - 3. Review sequence of operation narratives for each unique access controlled opening.
  - 4. Review and finalize construction schedule and verify availability of materials.
  - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.



## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

## 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

## 1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of the hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Final Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for standard duty cylindrical (bored) locks and latches.
5. Five years for exit hardware.
6. Five years for manual overhead door closer bodies.
7. Ten years for manual overhead door closer bodies.
8. Fifteen years for manual overhead door closer bodies.
9. Twenty five years for manual overhead door closer bodies.
10. Ten years for heavy duty floor closers.
11. Two years for shallow depth floor closers.
12. Five years for motorized electric latch retraction exit devices.
13. Two years for electromechanical door hardware, unless noted otherwise.

1.8 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

## 2.2 HANGING DEVICES

### A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:
  - a. Two Hinges: For doors with heights up to 60 inches.
  - b. Three Hinges: For doors with heights 61 to 90 inches.
  - c. Four Hinges: For doors with heights 91 to 120 inches.
  - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
  - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
  - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
  - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
  - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
  - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
  - a. HB Ives; An Allegion Group Company. (IV).
  - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
  - c. Best Hinges (ST).

### B. Pivots: ANSI/BHMA A156.4, Grade 1, certified. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:
  - a. ABH (AH).

- b. HB Ives (IV).
- c. Norton Rixson (RF).

## 2.3 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
  - 1. Manufacturers:
    - a. Schlage, Match Facility Existing.
- C. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
  - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
  - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
  - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
  - 4. Tubular deadlocks and other auxiliary locks.
  - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
  - 6. Keyway: Manufacturer's Standard. Match Facility.
- D. Interchangeable Cores: Provide small format interchangeable cores as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Removable Cores: Provide removable cores as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- F. Security Cylinders: ANSI/BHMA A156.5, Grade 1 Certified Products Directory (CPD) listed security cylinders and keys able to be used together under the same facility master or grandmaster key system. Cylinders to be factory keyed.
  - 1. Existing key system. Key into owner's existing Schlage system.
  - 2. Manufacturers:
    - a. Schlage.
  - 3. Supplier shall coordinate a "Keying Conference" to define and document keying system instructions and requirements to be held with owner's rep and Best Access Keying Dept.

4. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
5. Existing System: Field verify and key cylinders to match Owner's existing system.

G. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Four (4).

H. Construction Keying: Provide construction master keyed cylinders.

I. Construction Keying: Provide temporary keyed construction cores.

J. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

## 2.4 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Mortise locks to be certified Security Grade 1.
2. Where specified, provide status indicators with highly reflective color and wording for "locked/unlocked" or "vacant/occupied" with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1" x 0.6" with a curved design allowing a 180-degree viewing angle with protective covering to prevent tampering.
3. Manufacturers:
  - a. Corbin Russwin (RU) ML2000 Series LWA.
  - b. Schlage (SC) -L9000 Series 03A.
  - c. Yale Commercial (YA) - 8800FL Series. CRR.

## 2.5 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or

stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:
  - a. Corbin Russwin (RU) DL4000 Series.
  - b. Schlage (SC) -L400 Series.
  - c. Yale Commercial(YA) - 350 Series.

## 2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
  1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
  2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
  4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
  1. Strikes for Mortise Locks and Latches: BHMA A156.13.
  2. Strikes for Bored Locks and Latches: BHMA A156.2.
  3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
  4. Dustproof Strikes: BHMA A156.16.

## 2.7 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
  1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
  2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
  3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.

4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
  5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
  6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Manufacturers:
    - a. Corbin Russwin Hardware (RU) - DC6000 Series.
    - b. LCN (LC) -4010/4110 Series.
    - c. Norton Rixson (NO) - 7500 Series.

## 2.8 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.
1. Manufacturers:
    - a. ABH (AH) -2300 Series.
    - b. Norton Rixson (RF) - 980/990 Series.
    - c. LCN (LC) -SEM7800 Series.

## 2.9 ARCHITECTURAL TRIM

- A. Door Protective Trim
1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.

2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
  - a. HB Ives (IV).
  - b. Rockwood (RO).
  - c. Trimco (TC).

## 2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
  1. Manufacturers:
    - a. HB Ives (IV).
    - b. Rockwood (RO).
    - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
  1. Manufacturers:
    - a. ABH (AH).



- b. Norton Rixson (RF).
- c. Rockwood (RO).

## 2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
  - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
  - 1. National Guard Products (NG).
  - 2. Pemko (PE).
  - 3. Reese Enterprises, Inc. (RE).

## 2.12 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

## 2.13 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

### 3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

### 3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
  - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
  3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
  4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and 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 specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

### 3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

### 3.5 ADJUSTING

- A. Initial Adjustment: 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.

### 3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

### 3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

### 3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
  - 1. Quantities listed are for each pair of doors, or for each single door.
  - 2. The supplier is responsible for handing and sizing all products.
  - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
  - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
  - 5. Substitutions: See Section 01 60 00 – Product Requirements.

**HARDWARE SET 1.0**

Doors: 102

EACH TO RECEIVE:

1	Pivot Set	7226-SET US26D	IV
1	Intermediate Pivot	7226-INT US26D	IV
1	Deadlatch	4920AN 1-1/2" BS 628	AD
1	Lever Operator	4600 (deadlatches) 02-Round US32D	AD
1	Exit Device Trim	3080 02-Round US32D	AD
1	Cylinder	20-013 .626 L583-446	SC
1	Surface Closer	4111 .SCUSH .689 .TBSRT	LC
1	Shoe	4110-30 .689	LC
1	Spacer	4110-61 .689	LC
1	Drop Plate	4110-18 .689	LC
1	Threshold	655A-223 x 36"	ZE
1	Rain Drip	142AA x 40"	ZE
1	Sweep	39A x 36"	ZE

**HARDWARE SET 2.0**

Doors: 101A

EACH TO RECEIVE:

3	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 630 NRP	IV
1	Storeroom Lock	L9480 .P6 .03A .630	SC
1	Surface Closer	4111 .SCUSH .689 .TBSRT	LC
1	Threshold	655A-223 x 36"	ZE
1	Gasketing	429AA x 36" x 84"	ZE
1	Rain Drip	142AA x 40"	ZE
1	Sweep	39A x 36"	ZE

**HARDWARE SET 3.0**

Doors: 103

EACH TO RECEIVE:

3	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 630 NRP	IV
1	Storeroom Lock	L9480 .P6 .03A .630	SC
1	Overhead Holder/Stop	904S 630	GJ
1	Surface Closer	4011 .REGARM .689 .TBSRT	LC
1	Threshold	655A-223 x 36"	ZE
1	Gasketing	429AA x 36" x 84"	ZE
1	Rain Drip	142AA x 40"	ZE

**HARDWARE SET 4.0**

Doors: 104, 105

EACH TO RECEIVE:

3	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 630 NRP	IV
1	Public Toilet Lock w/ Ind.	L9473 .P6 .03A .630 .L283-711 .L283-722	SC
1	Surface Closer	4111 .SCUSH .689 .TBSRT	LC
1	Threshold	655A-223 x 36"	ZE
1	Gasketing	429AA x 36" x 84"	ZE
1	Rain Drip	142AA x 40"	ZE
1	Sweep	39A x 36"	ZE

END OF SECTION 08 71 00

**SECTION 08 80 00  
GLAZING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing compounds.

**1.02 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- E. ASTM C1036 - Standard Specification for Flat Glass 2021.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- H. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2019.
- I. GANA (GM) - GANA Glazing Manual 2008.
- J. GANA (SM) - GANA Sealant Manual 2008.
- K. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2020.
- L. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2020.
- M. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2020.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch (300 by 300 mm) in size of glass units, showing coloration and design.
- E. Samples: Submit 6 inch (150 mm) long bead of glazing sealant, color as selected.
- F. Certificate: Certify that products of this section meet or exceed specified requirements.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

### 1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

### 1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

### 1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com](http://www.cardinalcorp.com).
  - 2. Guardian Industries Corp: [www.sunguardglass.com](http://www.sunguardglass.com).
  - 3. Pilkington North America Inc: [www.pilkington.com/na](http://www.pilkington.com/na).
  - 4. Vitro Architectural Glass: [www.vitroglazings.com](http://www.vitroglazings.com).
    - a. Basis of Design or approved substitution.
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Design Pressure: Calculated in accordance with ASCE 7.
  - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

### 2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
  - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.



## 2.04 INSULATING GLASS UNITS

- A. Manufacturers:
  - 1. Glass: Any of the manufacturers specified for float glass.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Insulating Glass Units: Types as indicated.
  - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
  - 2. Metal-Edge Spacers: Aluminum, bent and soldered corners.
  - 3. Spacer Color: Black.
  - 4. Edge Seal:
    - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
  - 5. Color: Black.
- C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
  - 1. Applications: Exterior glazing unless otherwise indicated.
  - 2. Space between lites filled with argon.
  - 3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Gray.
    - b. Coating: Low-E (solar control type), on #2 surface.
  - 4. Inboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Clear.
  - 5. Total Thickness: 1 inch (25.4 mm).
  - 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.24, nominal.
  - 7. Visible Light Transmittance (VLT): 35 percent, nominal.
  - 8. Solar Heat Gain Coefficient (SHGC): .25 percent, nominal.
  - 9. Product: Solarban 60(2) Solargray + Clear by Vitro Architectural Glass (formerly PPG Glass) Basis of Design or approved substitution.
- D. Type IG-2 - Insulating Glass Units: Safety glazing.
  - 1. Applications: Where noted.
    - a. Glazed lites in exterior doors.
    - b. Glazed sidelights and panels next to doors.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Locations indicated on drawings.
  - 2. Glass Type: Same as Type IG-1 except use fully tempered float glass for both outboard and inboard lites.

## 2.05 ACCESSORIES

- A. Setting Blocks: Manufacturer's standard setting blocks, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option I. Minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color black.
- D. Glazing Clips: Manufacturer's standard type.

## PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### **3.03 INSTALLATION, GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### **3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### **3.05 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Final Acceptance in accordance with glass manufacturer's written recommendations.

### **3.06 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Final Acceptance.

**END OF SECTION**

**SECTION 09 05 61  
COMMON WORK RESULTS FOR FLOORING PREPARATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
  - 1. Resilient tile and sheet.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
  - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

**1.02 REFERENCE STANDARDS**

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

**1.04 SUBMITTALS**

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and alkalinity (pH) limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.
- B. Testing Agency's Report:
  - 1. Description of areas tested; include floor plans and photographs if helpful.
  - 2. Summary of conditions encountered.
  - 3. Moisture and alkalinity (pH) test reports.
  - 4. Copies of specified test methods.
  - 5. Recommendations for remediation of unsatisfactory surfaces.
  - 6. Submit report to Architect.
  - 7. Submit report not more than two business days after conclusion of testing.
- C. Adhesive Bond and Compatibility Test Report.

**1.05 QUALITY ASSURANCE**

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Contractor may perform adhesive and bond test with Contractor's own personnel or hire a testing agency.
- C. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
  - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- D. Contractor's Responsibility Relating to Independent Agency Testing:

1. Provide access for and cooperate with testing agency.
2. Confirm date of start of testing at least 10 days prior to actual start.
3. Allow at least 4 business days on site for testing agency activities.
4. Achieve and maintain specified ambient conditions.
5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.
- C. Keep materials from freezing.

#### **1.07 FIELD CONDITIONS**

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

### **PART 2 PRODUCTS**

### **PART 3 EXECUTION**

#### **3.01 CONCRETE SLAB PREPARATION**

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
  1. Preliminary cleaning.
  2. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
  3. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  4. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  5. Specified remediation, if required.
  6. Patching, smoothing, and leveling, as required.
  7. Other preparation specified.
  8. Adhesive bond and compatibility test.
  9. Protection.

#### **3.02 PRELIMINARY CLEANING**

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

#### **3.03 MOISTURE VAPOR EMISSION TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

#### **3.04 INTERNAL RELATIVE HUMIDITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

#### **3.05 ALKALINITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

#### **3.06 PREPARATION**

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

#### **3.07 ADHESIVE BOND AND COMPATIBILITY TESTING**

- A. Comply with requirements and recommendations of floor covering manufacturer.

#### **3.08 PROTECTION**

- A. Cover prepared floors with building paper or other durable covering.

**END OF SECTION**

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**SECTION 09 21 16  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Gypsum sheathing.
- C. Cementitious backing board.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.
- F. Acoustic (sound-dampening) wall and ceiling board.

**1.02 REFERENCE STANDARDS**

- A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- B. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- C. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2022.
- D. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- E. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- F. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels 2019, with Editorial Revision (2020).
- G. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- H. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- I. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- J. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on gypsum board, accessories, and joint finishing system.
  - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.
  - 2. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- C. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.
- B. Documents at Project Site: Maintain at the project site a copy of manufacturer's instructions, erection drawings, and shop drawings.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.

## **PART 2 PRODUCTS**

### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.

### **2.02 BOARD MATERIALS**

- A. Manufacturers - Gypsum-Based Board:
1. American Gypsum Company: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
  2. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  3. Georgia-Pacific Gypsum: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  4. National Gypsum Company: [www.nationalgypsum.com/#sle](http://www.nationalgypsum.com/#sle).
  5. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
  6. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  2. At wet locations: Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch (16 mm) Type X.
    - b. Ceilings: 5/8 inch (16 mm) Type X.
- C. Exterior Soffit Board: Exterior gypsum soffit board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings in protected exterior areas, unless otherwise indicated.
  2. Types: Type X, in all locations.
  3. Type X Thickness: 5/8 inch (16 mm).
  4. Edges: Tapered.

### **2.03 GYPSUM BOARD ACCESSORIES**

- A. Acoustic Insulation: As specified in Section 09 81 00.
- B. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, unless noted otherwise.
1. Corner Beads: Low profile, for 90 degree outside corners.
  2. Expansion Joints:
    - a. Type: V-shaped PVC with tear away fins.
- C. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Fiberglass Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners.
  2. Paper Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
  3. Joint Compound: Setting type, field-mixed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 FRAMING INSTALLATION**

- A. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- B. Blocking: Install wood blocking for support of:
1. Plumbing fixtures.
  2. Toilet accessories.
  3. Wall-mounted door hardware.



### 3.03 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
  - 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
- C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- D. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
  - 1. Seal joints, cut edges, and holes with water-resistant sealant.

### 3.04 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as directed.
  - 1. Not more than 30 feet (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

### 3.05 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 4: Walls and ceilings to receive flat paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 3: Walls to receive textured wall finish.
  - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
  - 5. Level 0: Surfaces indicated to be finished in later stage of project.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
- D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### 3.06 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

**END OF SECTION**

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**SECTION 09 65 00  
RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile 2004 (Reapproved 2018).
- D. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile 2020.
- E. ASTM F1861 - Standard Specification for Resilient Wall Base 2021.
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- E. Verification Samples: Submit two samples, 12x12 inch (300x300 mm) in size illustrating color and pattern for each resilient flooring product specified for Architect's approval.
- F. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Protect materials from damage by storing per manufacturer's recommendations.
- B. Deliver materials in good condition to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.
- C. Store materials in a clean, dry, enclosed space off the ground, and protected from the weather and from extremes of heat and cold. Protect adhesives from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

**1.05 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F (21 degrees C) to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F (13 degrees C).
- B. Maintain a minimum temperature in the spaces to receive the flooring and accessories of 65 degrees F (18 degrees C) and a maximum temperature of 100 degrees F (38 degrees C) for at

least 48 hours before, during, and for not less than 48 hours after installation. Thereafter, maintain a minimum temperature of 55 degrees F (13 degrees C) in areas where work is completed. Protect all materials from the direct flow of heat from hot-air registers, radiators, or other heating fixtures and appliances.

### 1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installing work similar to that required for this project with minimum three years of documented experience.
- B. Single-Source Responsibility: Obtain types of flooring and accessories and adhesive from a single manufacturer.

### 1.07 WARRANTY

- A. Manufacturer's Materials Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
  - 1. 5 year limited warranty commencing on Date of Final Acceptance.

### 1.08 MAINTENANCE MATERIALS

- 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. Vinyl Composition Tile and Resilient Base: Furnish quantity of full-size units equal to five (5) percent for each type, composition, color, pattern, size and shape installed.

## PART 2 PRODUCTS

### 2.01 TILE FLOORING

- A. Luxury Vinyl Tile - Type LVT: Printed film type, with transparent or translucent wear layer.
  - 1. Manufacturers:
    - a. Mohawk; [www.mohawkgroup.com](http://www.mohawkgroup.com). Basis of Design: Living Local Collection, Luxury Vinyl Tile Premium Wood.
    - b. Armstrong Flooring: [www.armstrongflooring.com/#sle](http://www.armstrongflooring.com/#sle).
    - c. Johnsonite, a Tarkett Company: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - d. Mannington Commercial: [www.manningtoncommercial.com/#sle](http://www.manningtoncommercial.com/#sle).
    - e. Shaw Contract Group, [www.shawcontract.com](http://www.shawcontract.com).
    - f. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1700, of Class III, Type A - Smooth, Type B - Embossed
  - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 4. Wear Layer Thickness: 0.020 inch (0.50 mm).
  - 5. Total Thickness: 0.100 inch (2.5 mm).
  - 6. Color: To be selected by Architect from manufacturer's full range.

### 2.02 RESILIENT BASE

- A. Resilient Base - Type RB: ASTM F1861, Type TS rubber, vulcanized thermoset; Style B, Cove.
  - 1. Manufacturers:
    - a. Johnsonite, a Tarkett Company: [www.johnsonite.com](http://www.johnsonite.com).
    - b. Mannington Commercial; \_\_\_\_\_: [www.manningtoncommercial.com/#sle](http://www.manningtoncommercial.com/#sle).
    - c. Roppe Corporation; Contours Profiled Wall Base System: [www.roppe.com/#sle](http://www.roppe.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 3. Height: 4 inch (100 mm).
  - 4. Thickness: 0.125 inch (3.2 mm).
  - 5. Finish: Matte.

6. Length: Roll.
7. Color: To be selected by Architect from manufacturer's full range.
  - a. Allow for three colors as selected by Architect from manufacturer's full range.

### **2.03 ACCESSORIES**

- A. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Verify that concrete sub-floor surfaces are dry enough and ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.
- E. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- F. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.
- D. Clean substrate.
- E. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.
- F. Perform subfloor moisture testing in accordance with ASTM F 2170, "Standard Test Method for Determining Relative Humidity in Concrete Slabs Using in-situ Probes", ASTM F1869, "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" and Bond Tests per manufacturer to determine if surfaces are dry; free of curing and hardening compounds, old adhesive, and other coatings; and ready to receive flooring. Relative humidity shall not exceed 80%, MVER shall not exceed 5 lbs./1000 sq. ft./24 hrs. Where both the Percent Relative Humidity and the Moisture Vapor Emission Rate tests are conducted, results for both tests shall comply with the allowable limits listed above. Do not proceed with flooring installation until results of moisture tests are acceptable. All test results shall be documented and retained.
- G. Perform pH tests on concrete floors regardless of their age or grade level. All test results shall be documented and retained.
- H. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in strict accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.

- D. Fit joints and butt seams tightly.
- E. Set flooring in place, press with heavy roller to attain full adhesion.
- F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
  - 1. Resilient Strips: Attach to substrate using adhesive.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Install flooring in recessed floor access covers, maintaining floor pattern.
- J. At movable partitions, install flooring under partitions without interrupting floor pattern.
- K. Install feature strips where indicated.
- L. Install multi-color accent tile in pattern as indicated on floor finish plan.
  - 1. Where no floor finish plan is provided a multi-color (four colors) layout shall be installed in all rooms larger than 144 square feet.
  - 2. Architect will provide final floor tile pattern design prior to installation.
  - 3. Pattern: Quarter turn.

### **3.04 INSTALLATION - TILE FLOORING**

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.
- C. Install square tile to ashlar pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

### **3.05 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Resilient Base - Miter internal corners. At external corners, use premolded units. At exposed ends, use manufacturer's premolded units.
- C. Millwork Resilient Base - Use manufacturer's premolded units at internal and external corners. At exposed ends use manufacturer's premolded units.
- D. Install base on solid backing. Bond tightly to wall and floor surfaces.

### **3.06 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

### **3.07 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Protect installed flooring as recommended by the flooring manufacturer against damage from rolling loads, other trades, or the placement of fixtures and furnishings.

**END OF SECTION**

**SECTION 09 81 00  
ACOUSTIC INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Batt Acoustical Insulation.

**1.02 REFERENCE STANDARDS**

- A. ASTM C 423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM C 553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- F. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.
- G. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- H. National Fire Protection Association (NFPA) Life Safety Code.

**1.03 SUBMITTALS**

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer with a minimum of ten years of documented experience manufacturing products in this section shall provide all products listed.
- B. Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five years of documented experience successfully installing insulation on projects of similar type and scope as specified in this section.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Store materials in dry locations with adequate ventilation, free from water, and in such a manner to permit easy access for inspection and handling.
- C. Handle materials to avoid damage.
- D. Ensure that products of this section are supplied in time to prevent interruption of construction progress.

**1.06 PROJECT CONDITIONS**

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 1. Basis of Design or approved substitution.
- B. Johns Manville: [www.jm.com](http://www.jm.com).
- C. Owens-Corning Fiberglass Corporation: [www.owenscorning.com](http://www.owenscorning.com).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 APPLICATIONS**

- A. Interior Partitions Indicated: Batt type.

### **2.03 MATERIALS**

- A. Acoustical/Thermal Insulation: CertainTeed Sound Attenuation NoiseReducer Batts preformed glass fiber batt insulation (Basis of Design or approved substitution).
  - 1. Location: Between studs - friction fit.
  - 2. Facing: ASTM C 665, Type 1, Unfaced.
    - a. Fire Hazard Classification ASTM E84.
    - b. Maximum Flame Spread Index of 25.
    - c. Maximum Smoke Developed Index of 50.
    - d. Noncombustible ASTM E 136, passes.
  - 3. Thermal Resistance: R of 11 (RSI 1.9).
  - 4. Thickness: 3 1/2 inches (89 mm).
  - 5. Width: As required by project conditions.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all interior walls, partitions, and ceiling assembly construction has been completed to the point where the insulation may correctly be installed.
- C. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

### **3.04 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Final Acceptance.

## **END OF SECTION**



**SECTION 09 91 13  
EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Exposed surfaces of steel lintels and ledge angles.
  - 2. Mechanical and Electrical:
    - a. On the roof and outdoors, paint equipment exposed to weather or to view, including factory-finished materials.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  - 5. Floors, unless specifically indicated.
  - 6. Glass.
  - 7. Concealed pipes, ducts, and conduits.

**1.02 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- D. SSPC-SP 6 - Commercial Blast Cleaning 2007.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
- C. Samples: Submit two paper chip samples, 2 x 2 inch (50 x 50 mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Samples: Submit two painted samples, illustrating selected colors for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 8 1/2 x 11 inch (216 x 279 mm) in size.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

#### **1.04 MAINTENANCE MATERIALS**

- A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years documented experience.

#### **1.06 MOCK-UP**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Benjamin Moore & Co.: [www.benjaminmoore.com](http://www.benjaminmoore.com).
  - 2. Pratt & Lambert Paints: [www.prattandlambert.com/#sle](http://www.prattandlambert.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 4. Valspar Corporation: [www.valsparpaint.com/#sle](http://www.valsparpaint.com/#sle).
- C. Primer Sealers: Same manufacturer as top coats.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  4. Supply each paint material in quantity required to complete entire project's work from a single production run.
  5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract.
  2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
  3. Extend colors to surface edges; colors may change at any edge as directed by Architect.

### **2.03 PAINT SYSTEMS - EXTERIOR**

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including roof mounted equipment.
1. Two top coats and one coat primer.
  2. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
1. One coat of block filler.
  2. Flat: Two coats of latex enamel.
- C. Paint GE-OP-3L - Exterior Gypsum Board and Exterior Plaster, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer.
  2. Flat: Two coats of latex.
- D. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of latex primer.
  2. Semi-gloss: Two coats of latex enamel.
- E. Paint ME-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with rust-inhibitive primer recommended by top coat manufacturer.
  2. Semi-gloss: Two coats of latex enamel.
- F. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
  2. Semi-gloss: Two coats of latex enamel.

### **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Exterior Plaster and Stucco: 12 percent.
  - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
- G. Ferrous Metal:
  - 1. Solvent clean according to SSPC-SP 1.
  - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
  - 3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- H. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

#### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Sand metal surfaces lightly between coats to achieve required finish.

- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

**3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.05 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Final Acceptance.

**END OF SECTION**

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**SECTION 09 91 23  
INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
- D. Do Not Paint or Finish the Following Items:
  - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
  - 2. Items indicated to receive other finishes.
  - 3. Items indicated to remain unfinished.
  - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
  - 5. Floors, unless specifically indicated.
  - 6. Glass.
  - 7. Concealed pipes, ducts, and conduits.

**1.02 REFERENCE STANDARDS**

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 6 - Commercial Blast Cleaning 2007.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
  - 2. MPI product number (e.g., MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
- C. Samples: Submit two paper chip samples, 2 x 2 inch (50 x 50 mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
- D. Samples: Submit two painted samples, illustrating selected colors for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 8 1/2 x 11 inch (216 x 279 mm) in size.
- E. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures.
- G. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets

(MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

#### **1.04 MAINTENANCE MATERIALS**

- A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Paint and Finish Materials: 1 gallon (4 L) of each color; from the same product run, store where directed.
  - 3. Label each container with color in addition to the manufacturer's label.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years documented experience.

#### **1.06 MOCK-UP**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F (3 degrees C) above the dew point, or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 1. Benjamin Moore & Co.: [www.benjaminmoore.com](http://www.benjaminmoore.com)
  - 2. Pratt & Lambert Paints: [www.prattandlambert.com/#sle](http://www.prattandlambert.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 4. Valspar Corporation: [www.valsparpaint.com/#sle](http://www.valsparpaint.com/#sle).
- C. Primer Sealers: Same manufacturer as top coats.



- D. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
  2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  3. Supply each paint material in quantity required to complete entire project's work from a single production run.
  4. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract.
  2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
  3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
  4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.
  5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

## 2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board and shop primed steel.
1. Two top coats and one coat primer.
  2. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
1. Medium duty applications include doors and door frames.
  2. Two top coats and one coat primer.
  3. Top Coat(s): High Performance Architectural Interior Latex; MPI #139, 140, or 141.
  4. Top Coat Sheen:
    - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
  5. Primer: As recommended by top coat manufacturer for specific substrate.
- C. Paint I-OP-MD-WC - Medium Duty Overhead: Including uncoated steel, shop primed steel, and galvanized steel.
1. Two top coats and one coat primer.
  2. Top Coat(s): High Performance Architectural Interior Latex.
  3. Top Coat Sheen:

- a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
4. Primer: As recommended by top coat manufacturer for specific substrate.
- D. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
  1. One coat of latex primer.
  2. Semi-gloss: Two coats of latex enamel.
- E. Paint Mgl-OP-3L - Galvanized Metals, Latex, 3 Coat:
  1. One coat galvanize primer.
  2. Semi-gloss: Two coats of latex enamel.
- F. Paint GI-OP-3A - Gypsum Board/Plaster, Alkyd Industrial, 3 Coat:
  1. One coat of alkyd primer sealer.
  2. Gloss: Two coats of industrial alkyd urethane.
  3. Locations: All toilet room and janitor's closet gypsum board walls.
- G. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
  1. One coat of alkyd primer sealer.
  2. Flat: Two coats of latex enamel.

#### **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been adequately prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  1. Gypsum Wallboard: 12 percent.
  2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

#### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- G. Galvanized Surfaces:
- H. Ferrous Metal:
  1. Solvent clean according to SSPC-SP 1.

2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
  3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 Commercial Blast Cleaning. Protect from corrosion until coated.
- I. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- F. Sand wood and metal surfaces lightly between coats to achieve required finish.
- G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### **3.04 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### **3.05 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

**END OF SECTION**

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**SECTION 10 14 00  
SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Building identification signs.

**1.02 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- D. ATBCB ADAAG - Americans with Disabilities Act Accessibility Guidelines; September 15, 2010.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Shop Drawings: Submit shop drawings listing sign size, letter form and letter heights.
- D. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- E. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- G. Verification Samples: Submit samples showing colors specified.
- H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

**1.04 QUALITY ASSURANCE**

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

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

**1.06 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Flat Signs:
  - 1. Best Sign Systems, Inc: [www.bestsigns.com/#sle](http://www.bestsigns.com/#sle).
  - 2. Inpro; \_\_\_\_\_: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 3. Mohawk Sign Systems, Inc: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 4. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
  - 5. ASI Sign Systems, Inc: [www.asisignage.com](http://www.asisignage.com).
  - 6. Gemini, Inc.: [www.geminisigns.com](http://www.geminisigns.com).
  - 7. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Dimensional Letter Signs:
  - 1. Inpro: [www.inprocorp.com](http://www.inprocorp.com).
  - 2. ASI Sign Systems, Inc: [www.asisignage.com](http://www.asisignage.com).
  - 3. Best Sign Systems, Inc: [www.bestsigns.com](http://www.bestsigns.com).
  - 4. Mohawk Sign Systems, Inc: [www.mohawksign.com](http://www.mohawksign.com).
  - 5. Gemini Incorporated: [www.geminisigns.com](http://www.geminisigns.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 SIGNAGE APPLICATIONS - FLAT**

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
  - 1. Sign Type: Flat signs with bonded panel media as specified.
  - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
    - a. Glue on letters are not acceptable.
  - 3. Character Height:
    - a. Room Numbers: 1 inch.
    - b. Lettering for Room ID Signs: 3/4 inch.
    - c. Symbol Size for Restrooms: 4 inch.
    - d. Braille: Grade 2 locate 1/2" below copy.
  - 4. Copy Position: As indicated on drawings.
  - 5. Sign Height: As necessary for compliance with ANSI/ICC A 117.1 Chapter 7.
  - 6. Classroom and Office Doors: Identify with room numbers to be determined later, not the numbers shown on the drawings; in addition, provide "window" section for replaceable occupant name.
    - a. View window: Two line.
  - 7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
  - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN" room numbers to be determined later, and braille.
    - a. 8" x 8" with a gender symbol and the verbal description placed directly below followed by Grade 2 braille.

### **2.03 BUILDING STREET NUMBER**

- A. Use individual die cut vinyl numbers.
  - 1. Size: 6 inches.
  - 2. Color: As selected by Architect from manufacturer's full range.
- B. Content: As indicated on plans or directed by owner.
- C. Location: As indicated on plans.

## **2.04 SIGN TYPES - FLAT**

- A. Flat Signs: Signage media without frame.
  - 1. Edges: Square.
  - 2. Corners: Radiused.
  - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
  - 4. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
- B. Color and Font: Unless otherwise indicated:
  - 1. Character Font: Helvetica, Arial, or other sans serif font.
  - 2. Character Case: Upper case only.
  - 3. Background Color: As selected by Architect from manufacturer's full range.
  - 4. Character Color: Contrasting color, to be selected by Architect from manufacturer's full range.

## **2.05 TACTILE SIGNAGE MEDIA**

- A. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
  - 1. Total Thickness: 1/8 inch (3 mm).
  - 2. Panel Edges: Square.
  - 3. Panel Corners: Radiused.
  - 4. Mounting: Tape Adhesive.
  - 5. Exterior room signs shall be rated for exterior use.

## **2.06 DIMENSIONAL LETTERS**

- A. Metal Letters:
  - 1. Metal: Aluminum sheet, flat.
  - 2. Product: ASI Series LPS Series, Cut Metal Dimensional Letters, Basis of Design or approved substitution.
  - 3. Mounting: Projected stud.
  - 4. Material: Aluminum.
  - 5. Finish: Baked enamel.
    - a. Color: To be selected by Architect from manufacturer's full range.
  - 6. Letter style: Sans Serif.
  - 7. Letter Height: as indicated on plans.
  - 8. Letter Depth: 1/2 inch.
  - 9. Content: As indicated on plans.

## **2.07 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Tape Adhesive: Double sided tape, permanent adhesive.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.
- B. Scheduling of installation implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.

- C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Locate signs where indicated:
  - 1. Room and Door Signs: Locate on wall at latch side of door.
    - a. Visual Characters: Height above floor to baseline of character 40 inches to less than or equal to 70 inches.
    - b. Tactile Characters: Height above floor to baseline of lowest raised character 48 inches minimum and 60 inches maximum measured to the baseline of the highest raised character.
  - 2. If no location is indicated locate in accordance with ANSI/ICC A 117.1, Chapter 7, Section 703.3.11.
- E. Protect from damage until Final Acceptance; repair or replace damaged items.

### **3.03 CLEANING**

- A. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance.
- B. Remove temporary coverings and protection to adjacent work areas.
- C. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 10 feet.

**END OF SECTION**



**SECTION 10 28 00**  
**TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Under-lavatory pipe supply covers.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures 2011 (Reaffirmed 2022).
- C. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2015a (Reapproved 2019).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- F. ASTM C1036 - Standard Specification for Flat Glass 2021.
- G. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2018.
- H. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping 2021.
- I. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- J. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. ASI - American Specialties, Inc: [www.americanspecialties.com](http://www.americanspecialties.com).
    - a. Basis of Design or approved substitution.
  - 2. Bradley Corporation: [www.bradleycorp.com](http://www.bradleycorp.com).
  - 3. Bobrick: [www.bobrick.com](http://www.bobrick.com).
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Provide products of each category type by single manufacturer.

**2.02 MATERIALS**

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
  - 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

- B. Keys: Provide two keys for each key operated accessory to Owner .
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- F. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- G. Adhesive: Two component epoxy type, waterproof.
- H. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

### **2.03 FINISHES**

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Back paint components where contact is made with building finishes to prevent electrolysis.

### **2.04 COMMERCIAL TOILET ACCESSORIES**

- A. Toilet Paper Dispenser, Type TD: Double roll, surface-mounted, satin stainless steel, theft-resistant spindle.
  - 1. Product: 7305-2S-R009 manufactured by ASI or approved substitution.
- B. Paper Towel Dispenser, Type P: Folded paper type, satin stainless steel, semi-recessed semi-recessed, with viewing slots on sides as refill indicator and tumbler lock and tumbler lock.
  - 1. Capacity: 400 minimum.
  - 2. Product: 0210 manufactured by ASI or approved substitution.
- C. Automated Soap Dispenser, Type SD: Liquid soap dispenser, wall-mounted, with stainless steel cover and window to gauge soap level, tumbler lock.
  - 1. Minimum Capacity: 34 ounces (1 liters).
  - 2. Product: 0360 manufactured by ASI or approved substitution.
- D. Mirrors, Type M: Stainless steel framed, 1/4 inch (6 mm) thick annealed float glass; ASTM C1036.
  - 1. Size: As indicated on drawings.
  - 2. Product: 20650 manufactured by ASI or approved substitution.
- E. Grab Bars, Type GB: Stainless steel, smooth smooth surface.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force (1112 N), minimum.
    - b. Dimensions: 1 1/2 inch (38 mm) outside diameter, minimum 0.05 inch (1.3 mm) wall thickness, concealed flange mounting, 1-1/2 inch (38 mm) clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.
    - e. Product: 3800-P manufactured by ASI or approved substitution.

### **2.05 UNDER-LAVATORY PIPE AND SUPPLY COVERS**

- A. Under-Lavatory Pipe and Supply Covers:
  - 1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
  - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
  - 3. Construction: 1/8 inch (3.2 mm) flexible PVC.
    - a. Comply with ASTM C1822, type I.
    - b. Comply with ASME A112.18.9.
    - c. Comply with ICC A117.1.
    - d. Microbial and Fungal Resistance: Comply with ASTM G21.

4. Color: White.
5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.

## **2.06 UTILITY ROOM ACCESSORIES**

- A. Combination Utility Shelf/Mop and Broom Holder, Type MS: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
  1. Hooks: Four, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
  2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
  3. Length: 36 inches (900 mm).
  4. Product: 1308-3 as manufactured by ASI or approved substitution.
  5. Installation: One in each janitors closet.
    - a. Coordinate location with owner.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. Verify that field measurements are as indicated on drawings.

### **3.02 PREPARATION**

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### **3.03 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights and Locations: As required by accessibility regulations

### **3.04 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

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**SECTION 10 44 00  
FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.
- D. Fire Department Key Lock Box.

**1.02 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide Current Edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).
- C. UL (DIR) - Online Certifications Directory Current Edition.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

**1.04 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
  - 1. Ansul, a Tyco Business: [www.ansul.com/#sle](http://www.ansul.com/#sle).
  - 2. Kidde, a unit of United Technologies Corp: [www.kidde.com](http://www.kidde.com).
  - 3. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  - 4. Pyro-Chem, a Tyco Business: [www.pyrochem.com/#sle](http://www.pyrochem.com/#sle).
  - 5. JL Industries, Inc. : [www.jlindustries.com](http://www.jlindustries.com).
  - 6. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  - 1. Stored Pressure Operated: Deep Drawn.
  - 2. Class: A:B:C type.
  - 3. Size: 10 pound (4.54 kg).
  - 4. Finish: Baked polyester powder coat, color as selected.
  - 5. Temperature range: Minus 40 degrees F (Minus 40 degrees C) to 120 degrees F (49 degrees C).

### **2.03 FIRE EXTINGUISHER CABINETS**

- A. Construction: Cold rolled steel.
- B. Configuration: Flat Trim, Fully Recessed.
  - 1. Sized to accommodate extinguisher and accessories.
- C. Type:
  - 1. Non-Rated: Provide at locations where no wall fire rating is indicated on plans.
- D. Door: 1/2 inch thick hollow metal heavy gauge.
  - 1. Style: Full panel.
  - 2. Opening: 180 degree.
  - 3. Hinge: Continuous piano.
  - 4. Handle: Polished chrome.
  - 5. Catch: Roller.
  - 6. Lock: None.
  - 7. Lettering: Red vertical, "Fire Extinguisher".
- E. Door Glazing: Float glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.
- F. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- G. Fabrication: Weld, fill, and grind components smooth.
- H. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
- I. Finish of Cabinet Interior: White colored enamel.
- J. Product: Larsen's Manufacturing Company "Architectural Series" or approved substitution.

### **2.04 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, galvanized and enamel finished.

### **2.05 FIRE DEPARTMENT LOCK BOX**

- A. Fire Department Lock Box - Basis of Design: 3200 series Knox-Box by Know Company or approved substitution.
- B. Fire Department Lock Box: Heavy-duty, recessed, solid stainless-steel box with hinged door and interior gasket seal; single drill resistant lock with dust covers and tamper alarm.
  - 1. Capacity: Holds 2 keys.
  - 2. Finish: Manufacturer's standard dark bronze.
  - 3. Door: Weather resistant gasket.
  - 4. Options:
    - a. Tamper alarm switch, UL Listed.
    - b. Recessed mounting kit.
    - c. Inside switch.
- C. Manufacturers - Fire Department Lock Box:
  - 1. Knox Company; Knox-Box Rapid Entry System: [www.knoxbox.com](http://www.knoxbox.com).
  - 2. Kidde: [www.kidde.com](http://www.kidde.com).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Location: Coordinate with Owner and Fire Marshal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings are correctly sized and located.

### **3.02 INSTALLATION**

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

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NCCCS: 2657

Division 10

CDL Instructional Training Facility

Nash Community College

- B. Install plumb and level in wall openings, inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

**END OF SECTION**

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**SECTION 12 21 13  
HORIZONTAL LOUVER BLINDS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Horizontal slat louver blinds.
- B. Operating hardware.

**1.02 REFERENCE STANDARDS**

- A. WCMA A100.1 - Safety of Window Covering Products 2018.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the placement of concealed blocking to support blinds. See Section 06 10 00.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating physical and dimensional characteristics.
- C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.
- D. Samples: Submit two samples, 6 inch long illustrating slat materials and finish, color, cord type and color.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.05 QUALITY ASSURANCE**

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

**1.06 PROJECT CONDITIONS**

- A. Coordinate the work with window installation and placement of concealed blocking to support blinds.
- B. Take field measurements to determine sizes required.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Horizontal Louver Blinds Without Side Guides:
  - 1. Hunter Douglas: [www.hunterdouglas.com](http://www.hunterdouglas.com).
  - 2. Levolor Contract: [www.levolorcontract.com](http://www.levolorcontract.com).
  - 3. SWFcontract, a division of Spring Window Fashions, LLC.: [www.swfcontract.com](http://www.swfcontract.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Source Limitations: Furnish blinds and associated controls produced by a single manufacturer and obtained from a single supplier.

**2.02 BLINDS WITHOUT SIDE GUIDES**

- A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.
- B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.
- C. Blinds: Horizontal slat louvers hung from full-width headrail with full-width bottom rail; manual control of raising and lowering by cord with full range locking; blade angle adjustable by control wand; complying with WCMA A100.1.
- D. Metal Slats: Spring tempered pre-finished aluminum; radiused slat corners, with manufacturing burrs removed.
  - 1. Width: 1 inch (25 mm).
  - 2. Thickness: 0.006 inch (0.15 mm).

3. Color: As selected by Architect from manufacturer's full range.
- E. Slat Support: Woven polypropylene cord, ladder configuration.
- F. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
  1. Color: Same as slats.
- G. Bottom Rail: Pre-finished, formed aluminum with top side shaped to match slat curvature; with end caps.
  1. Color: Same as headrail.
- H. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
  1. Free end weighted.
  2. Color: As selected by Architect.
- I. Control Wand: Extruded hollow plastic; hexagonal shape.
  1. Removable type.
  2. Length of window opening height less 3 inch (76 mm).
  3. Color: As selected by Architect from manufacturer's full range.
- J. Headrail Attachment: Wall brackets.
- K. Accessory Hardware: Type recommended by blind manufacturer.

### **2.03 FABRICATION**

- A. Determine sizes by field measurement.
- B. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch (6.25 mm).
- C. At openings requiring multiple blind units, provide separate blind assemblies with space of 1/4 inch (6.25 mm) between blinds, located at window mullion centers.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed. See Section 06 10 00.

### **3.02 INSTALLATION**

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with concealed fasteners.

### **3.03 TOLERANCES**

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch (6 mm).
- B. Maximum Offset From Level: 1/8 inch (3 mm).

### **3.04 ADJUSTING**

- A. Adjust blinds for smooth operation.

### **3.05 CLEANING**

- A. Clean blind surfaces just prior to occupancy.

**END OF SECTION**

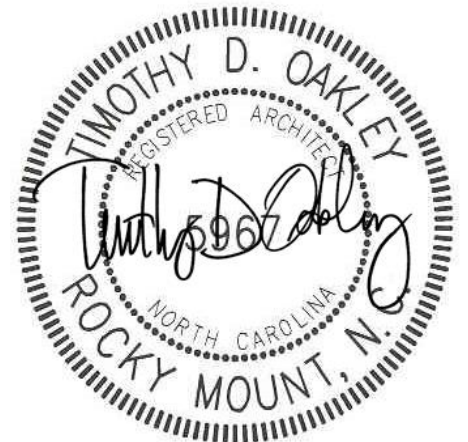
Project Manual

**New Building and Site Development for  
CDL Instructional Training Facility  
Nash Community College  
Parcel ID 345908, Eastern Avenue  
Rocky Mount, North Carolina 27804**



**PRE-BID DATE:** Tuesday, September 26, 2023  
**PRE-BID TIME:** 3:00pm  
**PRE-BID LOCATION:** Room 8123  
Continuing Education Building  
Nash Community College

**BID DATE:** Tuesday, October 10, 2023  
**BID TIME:** 3:00pm  
**BID LOCATION:** Brown Auditorium  
Business and Industry Center Building  
Nash Community College



**BID SET  
Specification Book 2 of 2**

August 2023

Architect's Project Number: 21056  
SCO ID: 22-24953-02A      NCCCS: 2657

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Oakley Collier Architects, PA  
109 Candlewood Road  
Rocky Mount, North Carolina 27804  
205 W Martin Street  
Raleigh, North Carolina 27601





## **SECTION 220500 – PLUMBING GENERAL PROVISIONS**

### **A. GENERAL**

#### **1. SCOPE OF WORK**

- a. The Contractor shall provide all materials, equipment and labor necessary to install and set into operation a complete plumbing system as shown on the engineering drawings and as specified herein.

#### **2. QUALITY ASSURANCE**

- a. See the General and Supplementary General Conditions.
- b. All work shall be in accordance with State Code and Underwriter's Regulations. Minimum requirements shall be the State Plumbing Code.
- c. Wherever the words "Approved", "Approval", or "Approved Equal" appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.
- d. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. "Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.
- e. All material and equipment that the Contractor proposes to substitute in lieu of those specified shall be submitted to the Engineer ten (10) days before the bid date for evaluation. The submittal shall include a full description of the material or equipment and all pertinent engineering data required to substantiate the equality of the proposed item to that specified. Items that are submitted for approval after this date will not be accepted. Section 01600 of the General Conditions will be followed for substitutions after award of the contract.

#### **3. SUBMITTALS**

- a. See General and Supplementary General Conditions.
- b. Within twenty days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit to the Architect/Engineer for approval a detailed list of equipment and material which he proposes to use. Items requiring submittal data for approval will be noted at this time. Six (6) sets of submittal data shall be provided for approval

- c. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number, and all necessary performance and fabrication data. Detailed submittal data shall be provided when items are to be considered as substitutions for specified items. Acceptance for approval shall be in writing from the Engineer.
- d. The Contractor shall submit to the Engineer a set of accurately marked-up plans indicating all changes encountered during the construction. Final payment will be contingent upon receipt of these as-built plans.
- e. The Contractor shall furnish four (4) bound sets of maintenance and operating instructions as outlined in Paragraph C, (Execution), Item #6, of this specification section.
- f. The Contractor shall submit to the Owner all certificates required for operating the system in compliance with the plans and specifications.

#### 4. PRODUCT DELIVERY, STORAGE AND HANDLING

- a. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.
- b. The Contractor shall protect all material and equipment from breakage, theft, or weather damage. No material or equipment shall be stored on the ground.
- c. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.

#### 5. WORK CONDITIONS AND COORDINATION

- a. The Contractor shall review the electrical plans to establish points of connection and the extent of electrical work to be provided in his Contract. A licensed electrician shall perform all electrical work.
- b. Electrical work shall be in accordance with State codes, and as specified in Division 16 contained herein.
- c. Pipe chases required for installation of work shall be provided by the General Contractor unless otherwise noted. This Contractor shall be responsible for coordinating the location of all required chases.
- d. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be at the Contractor's expense at no extra cost to the Owner.

## 6. GUARANTEE

- a. 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.
- b. The contractor shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the final acceptance of the work and shall replace such defective materials or workmanship without cost to the owner.
- c. Additionally, the contractor shall guarantee materials and workmanship against latent defects arising from faulty materials, faulty workmanship or negligence which is hidden or not readily apparent to the owner at the time of final acceptance and which is discovered by the owner within six (6) years following final acceptance of the work. The contractor shall replace such defective materials or workmanship without cost to the owner.

## B. PRODUCT

1. Materials and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Material and equipment found defective shall be removed and replaced at the Contractor's expense.
2. The Contractor shall provide nameplates for identification of all equipment, switches, panels, etc. The nameplates shall be laminated phenolic plastic, black front and back with white core, white engraved letters (1/4" minimum) etched into the white core. Nameplates shall be fastened with pan head tapping screws.

## C. EXECUTION

### 1. INSPECTION

- a. This Contractor shall examine the areas of completed work and shall insure that no defects or errors are present which would result in the poor application or installation of subsequent work.

### 2. INSTALLATION

- a. All work shall be performed in a manner indicating proficiency in the trade.
- b. All pipes shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.

- c. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.
- d. All finishing shall be by the General Contractor.
- e. The Contractor shall lay out and install his work in advance of pouring concrete floors or walls. He shall furnish all sleeves to the General Contractor for openings through poured masonry floors or walls, above grade, required for passage of all pipes required to support his equipment.
- f. All fixtures shall be accurately roughed in according to the manufacturer's installation dimensions so that no offset adaptors, flexible connections or other improvising are necessary. All incorrect work shall be torn out and corrected and walls and floors patched.
- g. Connections to cold water, soil and waste lines shall be made at locations shown on the Drawings.

### 3. PERFORMANCE

- a. The Contractor shall perform all excavation and backfill operations necessary for installation of his work.
- b. Rock excavation shall be defined in the Supplementary General Conditions. Unless specifically stated, neither rock excavation nor a unit price for rock excavation shall be required in the bid.

### 4. ERECTION

- a. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.

### 5. ADJUST AND CLEAN

- a. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.
- b. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for intended service. In no event shall nameplates be painted.
- c. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract.

### 6. MAINTENANCE AND OPERATING MANUAL



- a. The Contractor shall prepare four (4) copies of a manual describing the proper maintenance and system operation. This manual shall not consist of standard factory printed data intended for dimension or design purposes (although these may be included), but shall be prepared to describe this particular job. This manual shall include the following:
  - i. Index and page numbers.
  - ii. Certificate of substantial completion.
  - iii. A summary sheet of warranties with the dates noted and a copy of all warranties.
  - iv. List of all subcontractors and suppliers with names, addresses and phone numbers.
  - v. Certified testing and balancing report.
  - vi. All submittal data and shop drawings.
- b. The O & M manuals shall be installed in 3 ring heavy back note books with the name of the building and the words, "Operations and Maintenance Manuals" permanently affixed to the cover and spine.
- c. The operating and maintenance manuals shall be submitted to the Engineer (2) weeks before the pre-final inspection, for approval. When the manuals are considered complete by the Engineer, they will be turned over to the Owner for their permanent use.

END OF SECTION 220500



## **SECTION 220513 – ELECTRICAL WORK IN PLUMBING CONTRACT**

### **A. GENERAL**

1. This Contractor shall be responsible for the entire control system and control connections to all equipment installed as part of his contract.
2. Wiring from disconnect switches, junction boxes, panelboard circuit breakers, etc. up to plumbing equipment shall be by the electrical contractor. Refer to details on plans for connections to equipment from starter/disconnects.
3. All power and control wiring shall be in conduits.
4. All electrical work shall be performed by a licensed electrician.
5. All electrical work shall be in accordance with the State Building Code and all its supplements and the latest edition of the National Electrical Code.

### **B. PRODUCT**

1. All motor starters, disconnects, switches, relays, conduits, conductors, etc. that are required for a complete electrical power and/or control system shall conform to the requirements set forth by NEC.
2. Refer to the plans for the type, size and electrical characteristics of the starters, disconnects, switches, relays, conductor and conduits.
3. All conductors and conduits shall be sized as noted on the plans or as required per NEC.

### **C. EXECUTION**

1. All motor starters, disconnects, and switches shall be installed on or as close to the equipment they are serving as possible, or where shown on the plans.
2. Control wiring electrical connection to equipment subject to vibration which develops objectionable noises shall be made from the conduit system with short lengths of flexible "Liquid- Tite" conduit. Connection to other equipment shall be made with rigid conduit.
3. Control wiring conduits shall be run in a concealed space such as wall cavities, ceiling cavities, etc. except in the mechanical rooms where conduit may be run exposed.

END OF SECTION 220513



## **SECTION 220523 – PLUMBING VALVES**

### **A. GENERAL**

1. Valves shall be installed where indicated or required.
2. Insofar as possible, all valves shall be by the same manufacturer.
3. All valves stored on project site shall have ports closed.
4. Valves shall serve dual functions as shut-off and balancing valves.
5. Valves shall have an adjustable set point with locking mechanism which will permit closing of the valve and reopening of the valve to the previously determined set point.

### **B. PRODUCT**

1. Isolation/Shutoff valves up to and including 3” in line size shall be full port, forged brass ball valves with threaded ends, Watts Series FBV-1 or approved equivalent.
2. Isolation/Shutoff valves 4” and larger shall be full port, 125# class, epoxy coated cast iron, flanged ball valves suitable for potable water service, FDA approved, Watts Series G-4000-FDA or approved equivalent
3. Provide stem extensions, as necessary, to accommodate piping insulation.

### **C. EXECUTION**

1. All flanged connections shall be gasketed.
2. In no case shall raised face flanges be bolted to flat face flanges.
3. All valve stems shall be accessible and in no case shall valve stems be installed below horizontal.
4. The Contractor shall set in service all valves to operating conditions as part of his Contract.
5. The contractor shall provide 1” diameter brass valve tags for all valves.
6. The contractor shall provide ceiling markers for ceilings above lay-in ceiling.
7. The contractor shall provide a framed valve chart.

END OF SECTION 220523



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

### **A. GENERAL**

1. This Section includes all hangers and supports, etc. as may be required to provide a complete piping system.
2. The actual arrangement of the piping shall follow the general locations shown on the Drawings, such that clearances, line drainage, etc. shall be maintained.
3. Refer to specification Section 15110 for piping.

### **B. PRODUCT**

1. Piping shall be as stated in Piping Section(s).
2. Hangers and supports shall be as manufactured by B-Line Systems, Inc., PHD Manufacturing, Empire, or Modern Support Devices.

### **C. EXECUTION**

1. In no case shall this Contractor be allowed to cut or reduce the specified covering to allow the application of a smaller hanger than required.
2. Hangers shall be spaced as dictated by North Carolina Plumbing Code.
3. Hangers shall be provided at each change in direction.
4. Vertical risers shall be supported at each floor, 5 feet on center, and/or at changes in direction of pipe.
5. Do not support piping from bar joist bridging and/or roof deck.

END OF SECTION 220529





## **SECTION 220553 – IDENTIFICATION OF PLUMBING COMPONENTS**

### **A. GENERAL**

1. This section includes insulation for piping and equipment, as shown on the plans.
2. All coverings, and adhesives shall have a flame spread classification of 25 or less and a smoke developed rating of not more than 50.

### **B. PRODUCT**

### **C. EXECUTION**

#### 1. EQUIPMENT

- a. All water heaters shall be identified with equipment identification, equipment controlled, electrical ratings and date of installation.
- b. Equipment shall be clearly identified with engraved phenolic plates securely fastened to the equipment with sheet metal screws. Phenolic plates shall be white background and black lettering.
- c. All serviceable equipment located above ceilings or other concealed spaces shall clearly identified on an adjacent finished surface below service space. Label shall be engraved phenolic plate with white background and white letters. Label shall list name of equipment.

#### 2. PIPING AND VALVES

- a. Valve Identification
  - i. Project specific equipment
  - ii. All valves shall be tagged brass valve tags with chains for isolation and control valves.
  - iii. Provide valve tag chart in the O&M manual.
  - iv. Provide fanned valve tag chart with lexan cover mounted in each mechanical room. Chart shall include all valves in that room.
  - v. Include the tag numbers in the as-built drawings.
  - vi. Provide ceiling marker for isolation valves about lay-in ceilings.
- b. All piping shall be provided with identification in accordance with ANSI A13.1-1981 standards. Markets shall be fully legible from floor level showing medium contained pipe, and direction flow. Stenciling as indicated below will be acceptable in lieu of markers.

- c. Locate pipe markers and flow arrows as follows:
  - i. Maximum of 10ft and closer if congested.
  - ii. Near each valve
  - iii. Near each branch take off.
  - iv. Near equipment.
  - v. Near origination and termination points
  - vi. Near where pipe passes through walls (both sides of wall)
  - vii. Near access doors
  - viii. On piping above inaccessible ceilings as it enters and immediately after it exits.
- d. All exposed piping in mechanical rooms shall be painted and marked as listed below:

<b>Piping System</b>	<b>Color</b>	<b>Sherwin Williams Number</b>	<b>Lettering</b>
Dom. Cold Water	Dark Blue	SW6965	CW
Dom. Hot Water	Light Red	SW6868	HW
Dom. Hot Water Return	Light Red	SW6868	HWR
Natural Gas	Yellow	SW6911	GAS

- e. Pipe identification shall contrast in color to the pipe colors and be easily readable. The width of color bands should be equal to the size of the stencil indicated below.

END OF SECTION 220553

## **SECTION 220700 – PLUMBING INSULATION**

### **A. GENERAL**

1. The Contractor shall insulate hot water supply and return, and cold water piping as specified below.
2. All insulation, linings, coverings and adhesives shall have a flame spread classification of 25 or less and a smoke developed rating of not more than 50, except for exposed outside piping.

### **B. PRODUCT**

1. All hot and cold water piping (unless otherwise noted) shall be insulated with 1" thick fibrous glass materials with factory applied cover. All hot and cold water piping located in unconditioned spaces shall be insulated with 1 1/2" thick fibrous glass materials with factory applied cover. Cover shall be embossed vapor barrier, laminated with pressure sealing cap adhesive.
2. Closed cell insulation, of equal R-value may be used in lieu of fiberglass where concealed in walls. Insulation joints are to be sealed per manufacturer's recommendations. Taped joints will not be accepted. Insulation shall be finished with a fire retardant coating to attain proper fire rating.
3. All exposed piping in finished areas and equipment spaces shall have an additional layer of Kraft paper with vapor sealing tape followed by 8oz. /sq.yd. canvas cloth wrap, glued with two coats of sizing. Canvas shall be coated twice with Foster fireproof lagging to assure flame and smoke spread ratings.

### **C. EXECUTION**

1. Insulation shall be installed in accordance with manufacturer's recommendations.
2. All exterior piping insulation above grade shall be provided with a protective aluminum jacket with a factory-applied asphalt and Kraft paper moisture barrier. Aluminum jackets shall be cross-cirmped (longitudinally corrugated) for strength. Aluminum jackets shall be not less than 0.106" thick and shall be secured with aluminum or stainless steel screw; not more than 8" apart.
3. All piping exposed outdoors shall be wrapped with electric trace before insulation is applied.
4. Any pipe covered prior to leak testing shall be exposed at contractor expense.
5. All piping shall be provided with identification in accordance with ANDI A13.1-1981 standards. Markers shall be located at each wall, floor, and ceiling penetration, and at

every 25ft (10 feet in mechanical rooms). Markers shall be fully legible from floor level showing medium contained in pipe, and direction of flow. Wording on markers shall be as follows:

- a. “Domestic Cold Water Supply”.
  - b. “Domestic Hot Water Supply”.
6. Provide sheet metal saddle at each hanger. Provide wood blocking at each saddle.

END OF SECTION 220700

## **SECTION 221000 – PLUMBING PIPE AND FITTINGS**

### **A. GENERAL**

1. This section includes all pipe, pipe fittings, hangers, and supports, etc. as may be required to provide a complete water plumbing system.
2. The actual arrangement of the piping shall follow the general locations shown on the drawings, such that clearances, line drainage, etc. shall be maintained.
3. Refer to specification Section 15111.
4. Refer to specification Section 15112.
5. Refer to specification Section 15115.
6. Refer to specification Section 15120.

### **B. PRODUCT**

1. Domestic Water Pipe and Pipe Fittings
  - a. Copper Pipe
    - i. Water piping above grade shall be PEX pipe. Water piping below grade shall be PEX pipe (no joints below grade). Pipe shall conform to ASTM B-88 Specification.
    - ii. Water piping fittings shall be sweat or grooved type wrought copper conforming the ANSI-B16.22, ASME B16.18, or ASTM B584 Specification.
    - iii. Use silver solder or grooved couplings (Victaulic Style 607) on all piping.
    - iv. Grooved Pipe Joint Construction: Square cut pipe ends, and roll groove ends of pipe in accordance to manufacturer's specifications. Gaskets shall be verified as suitable for the intended service and shall be coated on the lips with a thin uniform coat of lubricant in accordance with the manufacturer's published instructions. For installation-ready coupling housing shall engage both grooves, otherwise the housing shall be assembled over the gasket and shall engage both grooves. The nuts shall be uniformly tightened until the housing pads are firmly together metal to metal, or until properly tightened per manufacturer's specifications and instructions. A factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A

distributor's representative is not considered qualified to conduct the training or jobsite visit(s).) To assure uniformity and compatibility of piping components in grooved end piping systems, all grooved products and grooving tools utilized shall be supplied by a single manufacturer. Grooved butterfly valves may be utilized on grooved copper piping systems; Victaulic Series 608.

- v. All piping systems shall be hydrostatically tested at 150 psi for a period of 48 hours without loss of pressure. Any leaks that occur shall be repaired and another test started.

b. CPVC Pipe

- i. Water piping and fittings shall be chlorinated polyvinyl chloride (CPVC). Pipe and pipe fittings shall conform to ASTM D-2846 specifications.
- ii. CPVC cement shall conform to ASTM F-493 specifications
- iii. Provide copper stub-outs at all fixture supplies.
- iv. Hot and cold water piping shall be supported in accordance with manufacturer's recommendations.
- v. Transition fittings (from CPVC to copper) shall be brass threaded CPVC. (Female CPVC threaded adapters are not permitted.)
- vi. All valves are to be brass. No CPVC valves will be allowed.
- vii. Provide expansion loop in accordance with manufacturer's recommendations.
- viii. All piping system shall be hydrostatically tested at 150 psi for a period of 48 hours without loss of pressure. Any leaks that occur shall be repaired and another test started.
- ix. CPVC pipe is not permitted in return air plenums. The contractor shall wrap CPVC pipe in return air plenums with 3M Firemaster Plenum Wrap (if approved by local inspector) or provide copper pipe.

c. Non-Potable Water Pipe and Pipe Fittings (CPVC)

- i. All pipe and pipe fittings to be manufactured from CPVC compound with a cell class of 24448 for pipe and 23447 for fittings as per ASTM D-1784.
- ii. Pipe and pipe fittings shall be listed by NSF International for reclaimed water, and bear the mark "NSF-rw".
- iii. Pipe and pipe fittings to be Copper Tube Size (CTS) manufactured to standard dimension ratio (SDR) 11 and shall conform to ASTM D-2846.

- iv. CPVC cement shall conform to ASTM F-493 specifications
  - v. Piping to meet a 25/50 flame spread and smoke developed rating per ASTM E 84 test protocol.
  - vi. Piping to be purple pigmented. Fittings to be either tan or purple in color.
  - vii. Piping is to marked “CAUTION: NON-POTABLE WATER. DO NOT DRINK”.
  - viii. All valves are to be brass. No CPVC valves will be allowed.
  - ix. Transition fittings shall have brass male or female connections with integral CPVC socket connections.
  - x. All piping system shall be hydrostatically tested at 150 psi for a period of 48 hours without loss of pressure. Any leaks that occur shall be repaired and another test started.
- d. Potable Water Pipe and Fittings (PEX)
- i. Water piping shall be crosslinked polyethylene (PEX) manufactured by PEX-a or Engel method, manufactured in accordance with ASTM F876 and ASTM F877.
  - ii. Pipe fittings shall be the PEX-a cold expansion type in compliance with ASTM F1960.
  - iii. Piping installation shall meet a 25/50 flame spread and smoke developed rating per ASTM E 84 test protocol.
  - iv. All valves are to be brass.
  - v. Piping shall be routed straight, in a neat manner, parallel to the building lines.
  - vi. Transition fittings (from PEX to copper) shall be brass connections
  - vii. Provide copper stub-outs at all fixtures.
  - viii. Hot and cold water piping shall be installed and supported in accordance with the manufacturer’s recommendations.
  - ix. Provide expansion loops in accordance with the manufacturer’s recommendations.
  - x. All piping shall be hydrostatically tested at 150 psi for a period of 48 hours without loss of pressure. Any leaks that occur shall be repaired and another test started.

## 2. Storm, Sanitary Waste and Vent Pipe and Pipe Fittings

- a. Cast Iron Pipe
  - i. Building sanitary sewer and storm line below grade shall be service weight cast iron, with hub and spigot type joints, with neoprene “Charlotte” seal.
  - ii. Building sanitary sewer, storm, and vent lines above grade shall be cast iron with no hub joints with stainless steel bands.
  - iii. Cast iron fittings to conform to piping specifications.
  - iv. Waste pipe shall be tested at each floor. A test tee will be installed below each floor and pipe will be filled with water for a height of 10’ above finished floor. The pipe shall be gas and water tight. Water shall stand in the system for a period of 3 hours without evidence of leakage.
  - v. Horizontal roof drain leaders above grade shall be insulated with 1” fiberglass.
  - vi. Waste piping, above ceilings, from floor drains shall be insulated with 1” fiberglass.
- b. PVC Pipe
  - i. Building sanitary sewer and storm lines below grade shall be schedule 40 PVC-DWV conforming to ASTM D-2665-68.
  - ii. Building sanitary sewer, storm, and vent lines above grade shall be schedule 40 PVC-DWV conforming to ASTM D-2665-68.
  - iii. PVC fittings to conform to piping specifications.
  - iv. Joints for PVC piping shall be made using the piping manufacturer’s approved solvent cement.
  - v. Waste pipe shall be tested at each floor. A test tee will be installed below each floor and pipe will be filled with water for a height of 10’ above finished floor. The pipe shall be gas and water tight. Water shall stand in the system for a period of 3 hours without evidence of leakage.
  - vi. PVC piping is not permitted in return air plenums.
  - vii. PVC piping is not permitted for dishwasher waste. Cast iron piping is to be used.
- c. PVC Pipe with Recycled Content
  - i. Pipe shall be manufactured from PVC compound with a minimum cell class of 11432 for the inside and outside layers and 11211 for the center layer per ASTM D-4396.



- ii. The center of the pipe shall be comprised of 100% recycled material and make 30-80% of the overall wall thickness.
- iii. Pipe shall be Schedule 40 iron pipe size (IPS) conforming to ASTM F-1760.
- iv. Fittings shall be manufactured from virgin rigid PVC compound with a cell class of 23447 per ASTM D-1784 and conform with NSF International standard 14. Fittings shall conform to ASTM D-2665.
- v. Solvent cements shall conform to ASTM D-2564, primer shall conform to ASTM F-656.
- vi. CPVC Chemical Waste Piping
  1. Special drainage system for corrosive or acid waste shall be manufactured from CPVC Type IV Grade 1 compounds with a minimum cell classification of 23447.
  2. Pipe and pipe fittings shall conform to ASTM F-2618.
  3. Pipe shall be Schedule 40 dimensions.
  4. One-Step solvent shall be specially formulated for chemical waste applications and conform to ASTM F-493.
  5. All pipe and pipe fittings shall be certified by NSF International for use in corrosive waste drainage systems and shall bear the mark “NSF-cw”.

### **C. EXECUTION**

1. Sleeves shall be provided wherever pipes pass through walls, floors, and ceilings. Sleeves shall be Schedule 40, black steel, ½” in diameter larger than the pipe or insulation on the pipe. Sleeves through floors shall be caulked and made watertight.
2. In pipe chases, the Contractor shall provide for suspension of all piping from the structure. Do not allow piping to rub against masonry when expanding and contracting.
3. Close and protect open ends of piping until final connections are made. Such closing shall be made with fittings which cannot be easily removed. Caps or plugs shall be required at all times during construction so that no pipes are left open at the end of any day’s work, even though continuation is expected the next day.
4. All piping and equipment installed under this Contract shall be tested in the presence of the Engineer or a designated representative of the Owner, and the proper Plumbing Inspector, proved tight for the periods stated above, or longer if required by the Inspector. Engineer shall be given 48 hour written notification of all tests.

5. No plumbing system or part thereof shall be covered or concealed until after it has been tested and approved. If such work has been covered or concealed before testing, it shall be exposed for testing.
6. All water piping shall be sterilized with chlorine, 50 milligrams per liter, and held for a 24-hour period, after which the system shall be flushed prior to being put into service. During the flushing of the system, all flush valves shall be thoroughly flushed out to insure the removal of sediment, pipe dope, etc., from water lines and flush valves, removing such working parts of the flush valves as may be deemed necessary. The system shall be drained and flushed sufficiently to provide chlorine residue of 0.2 ppm or less.

END OF SECTION 221000

## **SECTION 221119 – PLUMBING PIPING SPECIALTIES**

### **A. GENERAL**

1. This section includes miscellaneous items required for a complete plumbing system.

### **B. PRODUCT**

1. Escutcheons shall be chrome plated, spring type, on all pipes passing through walls and ceilings in finished areas. Floor escutcheons shall be cast brass, chrome plated, with set screw.
2. Stops shall be compression type, chrome plated, angle or straight way pattern on all fixtures, hot and cold water supply. On service sinks, use brass gate valve as specified.
3. Flashing for vents through the roof shall be two-piece type, 16 ounce copper counter flashing and base flashing, or a two-piece type, 4 pound lead counter flashing and base flashing. The base flashing shall be installed by the General Contractor with the roof system.
4. Pipe anchors for rough-in use shall be "Rapid Rough" products. Use for anchoring rough-in of all hot and cold water connections for all lavatories, sinks and other wall connected fixtures.
5. Insulating couplings shall be V-line, as manufactured by Walter Vallett or approved equal.
6. Shock absorbers shall be of all stainless steel construction and in conformance with P. D. I. Standard WH201. Shock absorbers shall be installed as noted at the locations shown on the plans and shall be totally accessible. Where there are no shock absorbers noted or shown on the plans, 18 inch air chamber type shock absorbers shall be installed at the hot and cold water supply to each fixture.
7. Unions shall be bronze body with packless brass ground joints. Wrought iron pipe unions shall be malleable iron, ground joint with bronze to iron seat.

### **C. EXECUTION**

1. Escutcheons shall be of sufficient size to cover outside diameter of the pipe or the insulation of the pipe.
2. Vent flashing shall extend down at least 4 inches from the top of the pipe. Flashing shall extend at least 12 inches in all directions from the pipe and shall be parallel to the roof line.

3. Pipe anchors for rough-in use shall be installed to hold pipes securely in alignment, according to the manufacturer's rough-in dimensions. Remove these devices after the wall is built around the pipes.
4. Unions shall be installed as shown on the plans, and where required, to disconnect piping for future replacement or repairs.
5. Dielectric unions shall be installed at hot water heaters and at any junction of dissimilar metal pipes.

END OF SECTION 221119

## **SECTION 224000 – PLUMBING FIXTURES**

### **A. GENERAL**

1. Provide plumbing fixtures as scheduled on the drawings.
2. All fixtures shall be by one manufacturer insofar as possible.
3. Submit shop drawings on the following:
  - a. Fixtures
  - b. Floor drains and cleanouts
  - c. Trim
4. All fixtures are to be white.

### **B. PRODUCT**

1. Products approved for use on this shall be as follows:
  - a. Fixtures: Kohler, American Standard, Eljer, Zurn, Toto, Crane
  - b. Stainless steel sinks: Elkay, Just
  - c. Flush Valves: Sloan, Delaney, Zurn
  - d. Floor drains and cleanouts: Zurn, Smith, and Josam.
  - e. Trim: Kohler, American Standard, Eljer, Chicago Faucets, T & S Brass and Bronze, Delta, Symmons, Sloan, Delaney, Stern-Williams, McGuire, Brasscraft, Cambridge Brass, Speakman, Zurn, Moen.

### **C. EXECUTION**

1. Fixtures and carriers shall be installed in accordance with the manufacturer's recommendations.
2. All fixtures, drains, traps, etc. shall be set plumb and level.
3. All handicapped fixtures and trim shall be installed in accordance with the State Building Code, latest edition.
4. Provide trap primer and required piping on all floor drains.
5. All fixtures are to be water saving type.
6. Provide vandal-proof options for all fixtures used by public. This includes screws, aerators, and showerheads.

END OF SECTION 224000



## SECTION 230500 – GENERAL MECHANICAL REQUIREMENTS

### A. GENERAL

1. Scope of Work
  - a. The Contractor shall provide all materials, equipment and labor necessary to install and set into operation a complete mechanical systems as shown on the engineering drawings and as specified herein.
2. Quality Assurance
  - a. See the General and Supplementary General Conditions.
  - b. All work shall be in accordance with State Code and Underwriter's Regulations. Minimum requirements shall be the State Plumbing, Mechanical, Gas, and Energy Code.
  - c. Wherever the words "Approved", "Approval", or "Approved Equal" appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.
  - d. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. "Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.
  - e. All material and equipment that the Contractor proposes to substitute in lieu of those specified, shall be submitted to the Engineer ten (10) days before the bid date for evaluation. The submittal shall include a full description of the material or equipment and all pertinent engineering data required to substantiate the equality of the proposed item to that specified. Items that are submitted for approval after this date will not be accepted. The General Conditions will be followed for substitutions after award of the contract.
3. Submittals
  - a. See General and Supplementary General Conditions.
  - b. Within twenty days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit to the Architect/Engineer for approval a detailed list of equipment and material which he proposes to use. Items requiring submittal data for approval will be noted at this time. Six (6) sets of submittal data shall be provided for approval
  - c. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number, and all necessary performance and fabrication data. Detailed submittal data shall be provided when items are to be considered as substitutions for specified items. Acceptance for approval shall be in writing from the Engineer.
  - d. The Contractor shall submit to the Engineer a set of accurately marked-up plans indicating all changes encountered during the construction. Final payment will be contingent upon receipt of these as-built plans.

- e. The Contractor shall furnish four (4) bound sets of maintenance and operating instructions as outlined in Paragraph C, (Execution), Item #6, of this specification section.
  - f. The Contractor shall submit to the Owner all certificates required for operating the system in compliance with the plans and specifications.
4. Product Delivery, Storage and Handling
- a. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.
  - b. The Contractor shall protect all material and equipment from breakage, theft, or weather damage. No material or equipment shall be stored on the ground.
  - c. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.
5. Work Conditions and Coordination
- a. The Contractor shall review the electrical plans to establish points of connection and the extent of electrical work to be provided in his Contract. All electrical work shall be performed by a licensed electrician.
  - b. Electrical work shall be in accordance with State codes, and as specified in Division 16 contained herein.
  - c. Pipe chases required for installation of work shall be provided by the General Contractor unless otherwise noted. This Contractor shall be responsible for coordinating the location of all required chases.
  - d. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be at the Contractor's expense at no extra cost to the Owner.
6. Guarantee
- a. 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.
  - b. The contractor shall unconditionally guarantee materials and workmanship against patent defects arising from faulty materials, faulty workmanship or negligence for a period of twelve (12) months following the final acceptance of the work and shall replace such defective materials or workmanship without cost to the owner.
  - c. The contractor shall provide a five year compressor warranty for all refrigeration compressors from date of system acceptance.
  - d. Additionally, the contractor shall guarantee materials and workmanship against latent defects arising from faulty materials, faulty workmanship or negligence which is hidden or not readily apparent to the owner at the time of final acceptance and which is discovered by the owner within six (6) years following final acceptance of the work. The contractor shall replace such defective materials or workmanship without cost to the owner.

**B. PRODUCT**



1. Materials and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Material and equipment found defective shall be removed and replaced at the Contractor's expense.
2. The Contractor shall provide nameplates for identification of all equipment, switches, panels, etc. The nameplates shall be laminated phenolic plastic, black front and back with white core, white engraved letters (1/4" minimum) etched into the white core. Nameplates shall be fastened with pan head tapping screws.

**C. EXECUTION**

1. Inspection
  - a. This Contractor shall examine the areas of completed work and shall insure that no defects or errors are present which would result in the poor application or installation of subsequent work.
2. Installation
  - a. All work shall be performed in a manner indicating proficiency in the trade.
  - b. All pipes shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.
  - c. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.
  - d. All finishing shall be by the General Contractor.
  - e. The Contractor shall lay out and install his work in advance of pouring concrete floors or walls. He shall furnish all sleeves to the General Contractor for openings through poured masonry floors or walls, above grade, required for passage of all pipes required to support his equipment.
  - e. All fixtures shall be accurately roughed in according to the manufacturer's installation dimensions so that no offset adaptors, flexible connections or other improvising are necessary. All incorrect work shall be torn out and corrected and walls and floors patched.
3. Performance
  - a. The Contractor shall perform all excavation and backfill operations necessary for installation of his work.
  - b. Rock excavation shall be defined in the Supplementary General Conditions. Unless specifically stated, neither rock excavation nor a unit price for rock excavation shall be required in the bid.
4. Erection
  - a. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.
5. Adjust and Clean
  - a. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.

- b. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for intended service. In no event shall nameplates be painted.
  - c. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract.
6. Maintenance and Operating Manual
- a. The Contractor shall prepare four (4) copies of a manual describing the proper maintenance and system operation. This manual shall not consist of standard factory printed data intended for dimension or design purposes (although these may be included), but shall be prepared to describe this particular job. This manual shall include the following:
    - 1) Index and page numbers.
    - 2) Certificate of substantial completion.
    - 3) A summary sheet of warranties with the dates noted and a copy of all warranties.
    - 4) List of all subcontractors and suppliers with names, addresses and phone numbers.
    - 5) Certified testing and balancing report.
    - 6) All submittal data and shop drawings.
  - b. The O & M manuals shall be installed in 3 ring heavy back note books with the name of the building and the words, "Operations and Maintenance Manuals" permanently affixed to the cover and spine.
  - c. The operating and maintenance manuals shall be submitted to the Engineer (2) weeks before the pre-final inspection, for approval. When the manuals are considered complete by the Engineer, they will be turned over to the Owner for their permanent use.

End of Section

## **SECTION 230513 – ELECTRICAL WORK IN MECHANICAL SCOPE**

### **A. GENERAL**

1. This Contractor shall be responsible for the entire control system and control connections to all equipment installed as part of his contract.
2. Wiring from disconnect switches, junction boxes, panelboard circuit breakers, etc. up to mechanical equipment shall be by the electrical contractor. Final electrical connections to mechanical equipment shall be by this contractor.
3. All power and control wiring shall be in conduits.
4. All electrical work shall be performed by a licensed electrician.
5. All electrical work shall be in accordance with the State Building Code and all its supplements and the latest edition of the National Electrical Code.

### **B. PRODUCT**

1. All motor starters, disconnects, switches, relays, conduits, conductors, etc. that are required for a complete electrical power and/or control system shall conform to the requirements set forth by NEC.
2. Refer to the plans for the type, size and electrical characteristics of the starters, disconnects, switches, relays, conductor and conduits.
3. All conductors and conduits shall be sized as noted on the plans or as required per NEC.

### **C. EXECUTION**

1. All motor starters, disconnects, and switches shall be installed on or as close to the equipment they are serving as possible, or where shown on the plans.
2. Electrical connection to equipment subject to vibration which develops objectionable noises shall be made from the conduit system with short lengths of flexible "Liquid- Tite" conduit. Connection to other equipment shall be made with rigid conduit.
3. Conduits shall be run in a concealed space such as wall cavities, ceiling cavities, etc. except in the mechanical rooms where conduit may be run exposed.



## **SECTION 230593 – TESTING AND BALANCING**

### **A. GENERAL**

1. Tests shall be made on all equipment and apparatus furnished under this contract for verification of performance of equipment and systems.
2. The Contractor shall indicate to the Engineer, at least five days prior to the scheduled time, when he will be prepared for a complete system checkout.
3. Operating conditions of all controls and major components shall be verified in the presence of the Engineer and the Owner's representative.
4. Heating and air conditioning system shall be balanced, adjusted and placed into service by personnel skilled as a result of training and experience in working with air distribution systems.
5. A certified independent test and balance contractor shall perform testing and balancing. The test and balance contractor shall be certified by National Environment Balancing Bureau (NEBB) or Associated Air Balance Council (AABC).
6. All necessary equipment, forms, reports, etc. required to perform the system testing and balancing shall be as recommended in the above named procedures.
7. The Contractor shall submit to the Engineer a letter stating the procedures, instruments, forms, etc. to be used for testing and balancing heating and air conditioning systems.
8. Final balancing data shall be submitted to the Engineer prior to final acceptance. After completion of the work, the Contractor shall state in a letter to the Engineer that the work conforms to plans and specifications. This Letter of Compliance is to be issued prior to final inspection and acceptance by the Owner.
9. A copy of the approved final balancing data should be included in the Maintenance and Operations Manuals.
10. After testing, all adjustable pitch motor pulleys shall be replaced with fixed pitch pulleys.



## SECTION 230713 – INSULATION

### A. GENERAL

1. This section includes insulation for piping, ductwork, and equipment, as shown on the plans.
2. All insulation, linings, coverings, and adhesives shall have a flame spread classification of 25 or less and a smoke developed rating of not more than 50.
3. Insulation shall be Certainteed, Owens Corning, or Johns-Manville.

### B. PRODUCT

1. Piping
  - a) All heating hot water supply and return piping, fittings, valves, elbows etc., above grade shall be insulated with 4 lb. density snap-on type glass fiber pipe insulation in molded sections with factory applied all service jacket. Seams shall be closely buttoned together and secured by self-sealing or pasting the all service lap. Fittings insulation shall be milled pre-fabricated of same material and thickness as on adjacent pipe. Exposed fittings shall be finished with 8 oz. canvas jacket neatly pasted in place or factory pre-formed PVC jacket covers. Piping 2" or less shall have 1" thick insulation. Piping larger than 2" shall have 2" thick insulation. Piping exposed in occupied spaces and mechanical equipment rooms shall have canvas lagged in place for painting.
  - b) All chilled water supply and return piping, fittings, valves elbows, etc., above grade shall be insulated with polyisocyanurate insulation in molded sections with factory applied all service jacket. Seams shall be closed butted together and secured by self-sealing or pasting the all service lap. Fittings insulation shall be milled pre-fabricated of same material and thickness as on adjacent pipe. Exposed fittings shall be finished with 8 oz. canvas jacket neatly pasted in place or factory pre-formed PVC jacket covers. Piping 1" or less shall have 1 ½" thick insulation. Piping larger than 1" shall have 2" thick insulation. Piping exposed in occupied spaces and mechanical equipment rooms shall have canvas lagged in place for painting.
  - c) All condensate drain piping, make-up water piping, all refrigerant suction piping, and all refrigerant piping exposed on the exterior of the building shall be insulated with 1.5" wall tubular closed cell elastomeric insulation with all joints butted and cemented tight. Insulation shall be Rubatex R-180-FS or equal.
3. Equipment
  - a) All equipment associated with the chilled water operation such as air separator, chiller (if not factory insulated), etc. shall be insulated with one inch thick 6 p.c.f. dense foam rubber insulation such as Armstrong Armaflex 22 or approved equal. The insulated surfaces shall be covered with eight-ounce canvas pasted in place and glue sized twice for painting. Canvas shall be coated twice with Foster fireproof lagging to assure specified flame and smoke spread ratings.
  - b) All equipment associated with the hot water operation such as air separators, converters, etc. shall be insulated with 2 ½" thick, high density fiberglass insulation such as Ultralite or approved equivalent by Owens-Corning or Johns-Manville. The insulated surface shall be covered with eight-ounce canvas as described in Paragraph B.1 about.

- c) All equipment associated with steam such as steam to hot water converter, etc., shall be insulated with 2" of calcium silicate insulation and covered with 30 lb. felt covering.

**C. EXECUTION**

1. Insulation shall be installed in accordance with manufacturer's recommendations.
2. All exterior piping insulation above grade shall be provided with a protective aluminum jacket with a factory-applied asphalt and kraft paper moisture barrier. Aluminum jackets shall be cross-crimped (longitudinally corrugated) for strength. Aluminum jackets shall be not less than 0.106" thick and shall be secured with aluminum or stainless steel screw; not more that 8" apart.
3. All piping exposed outdoors shall be wrapped with electric trace before insulation is applied.
4. No chilled water shall be allowed to circulate prior to completion of insulation.
5. Any pipe covered prior to leak testing shall be exposed at contractor expense.
6. All piping shall be provided with identification in accordance with ANSI A13.1-1981 standards. Markers shall be located at each wall, floor or ceiling penetration, and at every 20 ft. Markets shall be fully legible from floor level showing medium contained pipe, and direction flow. Wording on markers shall be as follows:
  - a. Hot Water Supply
  - b. Hot Water Return
  - c. Chilled Water Supply
  - d. Chilled Water Return



## **SECTION 233000 - DUCTWORK**

### **A. GENERAL**

1. This Section includes ductwork, splitter dampers, balancing dampers, air deflection devices, etc. required for a complete system.
2. The Drawings are intended to indicate, with reasonable accuracy, the location of components and the general arrangement of the system. All offsets, bends fittings and other devices, not shown but required for the full operation of the system, shall be provided.
3. Refer to specification Section 230700 for duct insulation.

### **B. PRODUCT**

1. Low and Medium Pressure Ductwork.
  - a) Round and rectangular ductwork shall be of gauges and construction methods as indicated in the latest ASHRAE Guide and SMACNA Standard.
  - b) Splitter dampers, balancing dampers, turning vanes and air deflection devices shall be installed as shown on the plans and/or where required for the proper control of airflow.
  - c) All take-offs to diffusers shall be tapered type taps with factory damper and locking quadrant.
  - d) All take-offs to VAV Units shall be made with conical taps.
2. Flexible Ductwork
  - a) Ducts shall be insulated type with foil wrapper complying with NFPA Standard No. 90A and UL181.
  - b) All flexible ducts shall have a factory installed 1" thick 1.5 lb./cu. ft. fiberglass insulation with a seamless vinyl vapor barrier.
  - c) Length of flexible duct shall not exceed 10 feet.
  - d) Flexible duct shall be secured and sealed in place with mastic to hard duct collars at each end, with nylon tie-wraps on the wire enforced inner mylar skin, followed by the insulation layer and then the exterior vapor layer secured with another tie-wrap.
3. Conditioned Air Exposed Ductwork Oval/Round Ductwork
  - a) Exposed shall be round, 18 gauge spiral lock seam with paintable finish, double wall and internally insulated at the factory. Inner wall shall be perforated.
  - b) Duct shall be fastened using sheet metal screws only and no duct tape.
4. Conditioned Air Exposed Ductwork Rectangular Ductwork
  - a) Rectangular ductwork shall be of gauges and construction methods as indicated in the latest ASHRAE Guide and SMACNA Standard
  - b) Increase sheet metal sizes for internal insulation. See 230700.
5. Un-Conditioned Air Exposed Ductwork Rectangular Ductwork

- a) Rectangular ductwork for paint booth intake and exhaust shall be of gauges and construction methods as indicated in the latest ASHRAE Guide and SMACNA Standard

## C. EXECUTION

1. Turning vanes shall be installed in square elbows for all ductwork.
2. Duct transitions, splitter dampers, and balancing dampers shall be constructed of gauges and materials as indicated in ASHRAE Guide and SMACNA Standards.
3. Hangers and supports for ductwork shall be of metal bands, angles and rods as indicated in ASHRAE Guide and SMACNA Standards. The minimum bandwidth shall be 1", 16 gauge, galvanized steel.
4. Where ductwork passes through floors and walls, the space around the ducts shall be sealed in an approved manner with mineral wool insulation, and/or proper fire seal material approved by the State or Local Inspector.
5. In exposed areas and mechanical rooms, ductwork openings shall be finished with a metal collar.
6. Ductwork shall be cross-braced and reinforced properly with galvanized steel angles as recommended by SMACNA Standards.
7. Where ductwork behind grilles or diffusers is visible, it shall be painted with two coats of flat black base fire retardant paint.
8. Duct connections to outside air louvers shall be pitched to drain outside and shall be soldered watertight.
9. Tape all low-pressure joints with Hardcast or approved equal for completely airtight system.
10. All medium pressure joints are to be sealed in accordance with SMACNA standards for ductwork 2" W.C. and greater. All ducts shall be air tight, rigid and free from vibration and noise.
11. Duct dimensions shown on the drawings are net inside dimensions.
12. Where ductwork is lined, as noted in Section 230700, the duct insulation thickness shall be added to the listed ductwork dimensions for final duct size.

END OF SECTION 230000

**SECTION 233400 – FANS**

A. GENERAL

1. Provide all fans, roof caps, etc., of the type and capacities indicated on the Drawings.
2. Fans, roof caps, curbs, etc., shall be by the same manufacturer.
3. Fans shall be by Greenheck, Loren Cook, Carnes, Penn, American Air Cool, or equal.

B. PRODUCT

1. All fans, roof caps, etc., shall be as scheduled on the Drawings.
2. All fans shall be equipped with 1/2" mesh birdscreen, gravity damper.
3. All fan motors shall have vibration isolators, motor housing shall be grounded, and motor overload protection shall be provided.
4. All curbs shall be of the pre-fab insulated type.
5. Provide NEMA 3R rated disconnect switch.

C. EXECUTION

1. Fans and roof caps shall be installed as shown on the plans.
2. Roof openings and locations are to be coordinated with the other trades.
3. Fan motors and all other electric components shall bear the UL or other acceptable third party testing agency label.

END OF SECTION 233400

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## SECTION 233700 - AIR DISTRIBUTION

### A. GENERAL

1. Furnish and install air distribution devices of the type, size and configuration indicated on the drawings.
2. Refer to Architectural Reflected Ceiling Plan and Schedule for types of ceiling specified, and provide compatible frames on air distributions devices.

### B. PRODUCT

1. Diffusers, Grilles, and Registers
  - a) Surface mounted devices shall have sponge gaskets.
  - b) Devices shall be of steel construction with baked on enamel finish, unless otherwise noted.
  - c) All devices shall be by Kureger, Carnes, Titus, Metalaire, Tuttle & Bailey, Price or approved equivalent.
  - d) Ceiling mounted diffusers shall have insulation applied to metal top and neck to prevent sweating. Insulation shall match duct insulation.
  - e) Soffit grilles shall be extruded anodized aluminum with  $\frac{1}{4}$ " x  $\frac{1}{4}$ " insect screen.
  - f) Return and exhaust grilles in lay-in ceilings shall have full louvered face (24" x 24").
  - g) Devices in moist and humid spaces shall be of aluminum construction.
  - h) Provide heavy-duty steel return grilles (in gymnasiums, multi-purpose rooms, etc) or in all locations where the grille is within 8' off the floor.
2. Louvers
  - a) Louvers shall be 12 gauge extruded aluminum with drainable blades, unless otherwise noted.
  - b) Louvers shall be provided with  $\frac{1}{2}$ " x  $\frac{1}{2}$ " insect screen.
  - c) Louvers shall be Arrow, Ruskin, Pottorff or approved equivalent.
  - d) Provide louvers with required mounting sleeves/support. Coordinate opening with general contractor.
  - d) Louver indicated on drawings to have motorized damper shall be interconnected with fans indicated, and shall open when the fan is energized. This Contractor shall provide and make all interconnecting control wiring from the fan to the damper.

### C. EXECUTION

1. Air distribution devices shall be mounted level, straight, and flush with walls or ceilings.
2. Color shall be as indicated on drawings, or as selected by the Architect/Engineer.
3. Locations of all air distribution devices shall be coordinated with ceiling and lighting work.
4. Provide submittals data to include, cfm, pressure drop, dimensional, velocity and noise criteria data

END OF SECTION 233700

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## **SECTION 238143 – SPLIT SYSTEM HEAT PUMP**

### **A. GENERAL**

1. Furnish and install a direct expansion heat pump indoor unit with capacity as indicated on the plans.
2. Unit shall be completely factory assembled and pretested.
3. Unit shall be Trane, Lennox, Mitsubishi, or approved equivalent.

### **B. PRODUCT**

1. Air Handling Unit/Fan Coil
  - a. Casing shall be Galvanneal steel, bonderized with baked enamel finish.
  - b. Fan section shall have forward curved blades, centrifugal type, belt or direct drive. Fan shall be statically and dynamically balanced and shall run on permanently lubricated bearings.
  - c. Cooling coils shall be of non-ferrous construction with mechanically bonded aluminum plate fins on copper tube.
  - d. Casing shall be insulated with fire retardant insulation in accordance with NFPA 90A. Insulation shall be secured to casing panels with waterproof cement and permanent fasteners.
  - e. A condensate drain pan shall be furnished with threaded pipe connections and shall extend completely under the coil section. Condensate drain lines shall be insulated copper.
  - f. Electric heater assembly shall include circuit breakers, automatic re-setting limit switches and heat limiter for primary and secondary over-current and thermal protection.
  - g. Accessories shall be as indicated on the drawings.
2. Outdoor Unit
  - a. Cabinet shall be single, enclosed, and weatherproof casing or galvanized steel bonderized and finished with baked enamel. A base pan drain connection shall be provided. Panels shall be easily removable for service access.
  - b. Compressor system shall consist of serviceable hermetic compressor. Compressor shall have service shut-off valves; suction pressure operated capacity control unloader, suitable vibration isolators and crankcase heater.

- c. Condenser and evaporator coils shall have aluminum plate fins mechanically bonded to copper tubes.
- d. Outdoor fans shall be propeller type, direct driven. All motors shall have overload protection and suitable vibration isolators. Cooling system shall be protected by fusible plug, high and low pressure stat, compressor motor overloads, anti-cycling timer device (5 minutes). Controls shall include low voltage control circuit transformer, compressor and fan motor safety controls with automatic reset, high and low pressure cutout switches and terminals for accessory electrical connections.

### **C. EXECUTION**

- 1. Unit shall be installed as shown on the plans, in strict accordance with manufacturer's recommendations.
- 2. Controls shall be as indicated on the plans.
- 3. Provide 5-year compressor warranty.
- 4. Provide with spare belts for any belt driven fans.
- 5. Provide with (2) sets of filters. Contractor to install one set at system start-up and a second set at completion of project.

END OF SECTION 238143



## **SECTION 238239 – ELECTRIC UNIT HEATER**

### **A. GENERAL**

1. Heating units shall be installed where indicated on the drawings.
2. All heating units shall be by the same manufacturer.
3. Heating units shall be Q-Mark, Markel, or approved equivalent.

### **B. PRODUCT**

1. Heating units shall be shall UL listed.
2. Heating units shall be provided with baked-on enamel finish.
3. Heating element to be heavy-duty steel finish brazed to steel sheathed turbulence elements.

### **C. EXECUTION**

1. Unit(s) shall be installed as shown on the drawings.
2. Unit(s) shall be provided with accessories noted on the drawings.

END OF SECTION 238239



## **SECTION 260000 - GENERAL PROVISIONS (ELECTRICAL) CONTRACT**

### **A. GENERAL**

1. Scope of Work
  - a. This Contractor shall provide all materials, equipment and labor necessary to install and set into operation the electrical equipment as shown on the Engineering Drawings and as contained herein.
2. Quality Assurance
  - a. See the General and Supplementary General Conditions.
  - b. All work shall be in accordance with the North Carolina State Building Code, which includes the 2020 edition of the National Electrical Code.
  - c. Wherever the words "Approved", "Approval", and "Approved Equal" appear, it is intended that items other than the model numbers specified shall be subject to the approval of the Engineer.
  - d. "Provide" as used herein shall mean that the Contractor responsible shall furnish and install said item or equipment. "Furnish" as used herein shall mean that the Contractor responsible shall acquire and make available said item or equipment and that installation shall be by others. "Install" as used herein shall mean that the Contractor responsible shall make installation of items or equipment furnished by others.
  - e. All material and equipment that the Contractor proposes to substitute in lieu of those specified shall be submitted to the Engineer ten (10) days prior to the bid date for evaluation. The submittal shall include a full description of the material or equipment and all pertinent engineering data required to substantiate the equality of the proposed item to that specified. Article 8 of the General Conditions will be followed for substitutions after award of Contract.
3. Submittals
  - a. See General and Supplementary General Conditions and Division 1.
  - b. Within ten (10) days after notification of the award of the Contract and written notice to begin work, the Contractor shall submit for approval to the Architect/Engineer a detailed list of equipment and material which he proposes to use. Items requiring submittal data for approval will be noted at this time. Six (6) sets of submittal data shall be provided for approval.
  - c. Each submittal shall bear the approval of the Contractor indicating that he has reviewed the data and found it to meet the requirements of the specifications as well as space limitations and other project conditions. The submittals shall be clearly identified showing project name, manufacturer's catalog number and all necessary performance and fabrication data. Detailed submittal data shall be provided when items are to be considered as substitution for specified items. Acceptance for approval shall be in writing from the Engineer.

- d. The Contractor shall submit to the Engineer a set of accurately marked-up plans indicating all changes encountered during the construction. Final payment will be contingent on receipt of these as-built plans.
  - e. The Contractor shall furnish four (4) bound sets of maintenance and operating instructions, parts lists, electrical circuit wiring diagrams, all submittal data, and sufficient manufacturer's literature to operate and maintain all equipment.
  - f. The Contractor shall submit to the Engineer a duplicate set of final electrical inspection certificates prior to final payment.
4. Product Delivery, Storage and Handling
- a. All material and equipment shall be delivered and unloaded by the Contractor within the project site as noted herein or as directed by the Owner.
  - b. The Contractor shall protect all material and equipment from breakage, theft or weather damage. No material or equipment shall be stored on the ground.
  - c. The material and equipment shall remain the property of the Contractor until the project has been completed and turned over to the Owner.
5. Work conditions and Coordination
- a. The Contractor shall review the mechanical plans to establish points of connection and the extent of electrical work to be provided in his Contract.
  - b. This Contractor shall be responsible for all electrical work and make final connections to equipment installed in his Contract. Unless otherwise noted, this Contractor shall wire to disconnect switches, junction boxes, or circuit breakers as provided in his Contract.
  - c. All work shall be coordinated with other trades. Cutting of new work and subsequent patching shall be approved by Architect/Engineer and shall be at the Contractor's expense with no extra cost to the owner.
6. Guarantee
- a. See the General and Supplementary General Conditions.
  - b. Where extended warranties or guarantees are available from the manufacturer, the Contractor shall prepare the necessary Contract Documents to validate these warranties as required by the manufacturer and present them to the Owner.

## **B. PRODUCT**

1. Materials and equipment shall be new, unless noted otherwise, of the highest grade and quality and free from defects or other imperfections. Materials and equipment found defective shall be removed and replaced at the Contractor's expense.
2. The Contractor shall provide nameplates for identification of all equipment, switches, panels, transformers, etc. See specification section 260553 Electrical Identification.

3. All materials and equipment shall be approved third party agencies or bear re-examination listing where such approval has been established for the type of device in question. Third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment

## C. EXECUTION

### 1. Inspection

- a. If any part of this Contractor's work is dependent for its proper execution or for its subsequent efficiency or appearance on the character or conditions of contiguous work not executed by him, the Contractor shall examine and measure such contiguous work and report to the Architect or Engineer in writing any imperfection therein, or conditions that render it unsuitable for the reception of this work. Should the Contractor proceed without making such written report, he shall be held to have accepted such work and the existing conditions and he shall be responsible for any defects in this work consequent thereon and will not be relieved of the obligation of any guarantee because of any such imperfection or condition.
- b. It is the responsibility of the electrical contractor to notify **Nash County Electrical Inspector** to schedule required inspections including rough-in, above ceiling and final inspections.

### 2. Installation

- a. All work shall be performed in a manner indicating proficiency in the trade.
- b. All conduit, pipes, ducts, etc., shall be either parallel to building walls or plumb where installed in a vertical position and shall be concealed when located in architecturally finished areas.
- c. Any cutting or patching required for installation of this Contractor's work shall be kept to a minimum. Written approval shall be required by the Architect/Engineer if cutting of primary structure is involved.
- d. All patching shall be done in such a manner as to restore the areas or surfaces as to match existing finishes.
- e. The Contractor shall lay out and install his work in advance of pouring concrete floors or walls. He shall furnish and install all sleeves or openings through poured masonry floors or walls above grade required for passage of all conduits, pipes or duct installed by him. The Contractor shall furnish and install all inserts and hangers required to support his equipment.
- f. Grounding
  - 1) All grounding shall be in accordance with the requirements of the NEC. The main service ground shall be bare copper wire in conduit clamped to building structural steel. Bond ground wire to conduit at each end. At service equipment, do not bond system neutral bus to equipment grounding bus per NEC 250.32, connect ground bar to ground wire from existing building D. In addition, cad weld to 10'x 3/4" diameter copper clad steel driven ground rod and clamp to metal cold water main. See the Electrical Riser Diagram.

- 2) Install a separate green grounding conductor with the circuit conductors in each conduit. Use of the conduit only shall not be an acceptable means of equipment grounding.
  - 3) Install ground wire in all flexible connections (flex shall not be acceptable for grounding purposes), and in all wiremold.
  - 4) All grounding conductors shall be sized per Article 250.122 of the NEC.
  - 5) The ground system shall be tested with a ground resistance and soil resistivity tester and the test report submitted to the Engineer. If resistance exceeds 25 ohms provide an additional driven ground rods separated by a minimum of 6' interconnected with #3/0 copper. A copy of the test report shall be submitted to the engineer to be included in the project closeout document
  - 6) All ground points shall be accessible for inspection.
  - 7) Boxes with concentric, eccentric or over-sized knockouts shall be provided with bonding bushings and jumpers. The jumper shall be sized per NEC Table 250.122 and lugged to the box.
- g. Electrical Identification. See section 260553
3. Performance
- a. The Contractor shall perform all excavation, backfilling, and patching operations as indicated on the drawings.
4. Erection
- a. All support steel, angles, channels, pipes or structural steel stands and anchoring devices that may be required to rigidly support or anchor material and equipment shall be provided by this Contractor.
5. Field Quality Control
- a. The Contractor shall conform to the requirements of Division 3 for concrete testing.
  - b. The Contractor shall test his entire installation and shall furnish the labor and materials required for these tests. Tests shall be performed in accordance with the requirements of the particular section of the specifications and in accordance with the requirements of the State Ordinances and Codes, and the National Electrical Code. The Contractor shall notify the Engineer of his readiness for such test. Final inspections by the N.C. Department of Insurance and N.C. Department of Administration (State Construction Office) are required, as State Inspectors' Certificates are required, prior to authorization of final payment.
  - c. Testing required for compliance with the Contract shall be stated in subsequent sections. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information. All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.
  - d. Documentation

- 1) All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information.
  - 2) All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.
6. Adjust and Clean
- a. All equipment and installed materials shall be thoroughly clean and free of all dirt, oil, grit, grease, etc.
  - b. Factory painted equipment shall not be repainted unless damaged areas exist. These areas shall be touched up with a material suitable for the intended service. In no event shall nameplates be painted.
  - c. At a scheduled meeting, the Contractor shall instruct the Owner or the Owner's representative in the operation and maintenance of all equipment installed under his Contract (in the presence of the Engineer).

**END OF SECTION 260000**





**SECTION 260520 - WIRES AND CABLES****A. GENERAL**

1. All conductors shall be properly marked showing manufacturer's name, insulation type, voltage rating and wire size. All insulation is to be rated for minimum of 600 volts.
2. Wire sizes shall be as shown. No wire smaller than No. 12 AWG shall be used. The maximum conductor size shall be 500 KCMIL.
3. Where the conductor length from the panel to the first outlet on a 120 volt exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall be increased by at least one size. Provide associated drawing modifications as needed for compliance with NEC Art 250.122(B) proportional increase in equipment ground conductor wherever ungrounded conductor sizes are increased for voltage drop.
4. Conductors shall be manufactured by US Wire and Cable, Triangle, Okonite, Southwire, or approved equivalents.

**B. PRODUCT**

1. All conductors shall be copper and shall conform to Underwriters' Standards. Wires No. 10 and smaller shall be solid. Wires 8 and larger shall be stranded.
2. All wire shall be labeled two (2) feet on centers giving size, type voltage, rating, and manufacturer's name. Wire #6 and smaller #6 shall be factory color coded. Wire larger than #6 may be color coded with Okonite 2000 volt colored tape at all terminals of the run, and at all junctions.
3. Where applicable, all wire shall be color coded as follows, or approved by the Engineer:
  - a. 120/240 volt system:
    - Phase A - Black
    - Phase B - Red
    - Neutral - White
    - Ground - Green
4. Insulation type shall be UL labeled for the appropriate type of use and temperature. Insulation types are as follows:
  - a. The insulation type for interior wiring shall be dual-rated THHN/THWN or XHHW.
  - b. The insulation type for wiring in exterior wet locations shall be THWN-2 or XHHW-2.

**C. EXECUTION**

1. Conductors shall be run in conduit and shall be continuous from outlet to outlet. Splices will not be made except within accessible outlet or junction boxes, troughs, or gutters.
2. Solid conductors shall be spliced by using Ideal "wing-nuts", 3M Company's "Scotchlok" connectors for branch circuit splices. Crimp connectors will not be allowed for branch circuit splicing.

3. Joints in stranded conductors shall be spliced by approved mechanical connectors and gum rubber tape or friction tape. Solderless mechanical connectors for splices and taps, provided with U/L-approved insulating covers, may be used instead of mechanical connectors plus tape.
4. On mechanical splices, taps or joints taping shall be with at least two (2) layers of approved gum rubber tape which will be laid on the half-lap followed by at least one (1) layer of friction or plastic tape laid on with half-lap. It is intended that all taping shall be a permanently secured insulation equal to that of the wire.
5. All conductors in any conduit shall be at one specific voltage. Conductors of different voltages shall be run in separate conduits.
6. Neutral conductors shall be properly installed as to prevent grounding of the neutrals in any conduit. Multi-wire circuits with shared neutral conductors are not allowed. Each single pole load shall have individual neutral for each circuit.
7. Neatly train and lace wiring inside boxes, equipment, and panelboards.
8. Make conductor lengths for parallel circuits equal.
9. Pull all conductors into a raceway at the same time. Use third party approved wire pulling lubricant for pulling #4 AWG and larger wires.
10. Insulation Resistance Testing.

All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt insulation resistance testing. The procedures listed below shall be followed:

- Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
  - After all fixtures, devices and equipment are installed and all connections completed to each panel, the contractor shall disconnect the neutral feeder conductor from the neutral bar and take a insulation resistance testing reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The contractor shall correct troubles, reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
  - The contractor shall send a letter to the engineer certifying that the above has been done and tabulating the insulation resistance testing readings for each panel. This shall be done at least four (4) days prior to the final inspection.
  - At the final inspection, the contractor shall furnish a insulation resistance testing and demonstrate to the engineer and State Construction Office representative (applicable for state projects) that the panels comply with the above requirements. The contractor shall also furnish a hook-on type ammeter and a voltmeter to take current and voltage readings as directed by the engineer and Construction office representative.
11. Use of split bolt connectors is not acceptable.

12. Prior to energizing, feeders and service conductor cables shall be tested for electrical continuity and short circuits. A copy of these tests shall be included with the project record document.
13. Voltage Drop:
  - Conductors for branch circuits shall be sized to prevent a voltage drop exceeding three percent (3%) at the farthest outlet of power, heating and lighting loads, or any combination of such loads. The maximum total voltage drops on both feeders and branch circuits to the farthest outlet shall not exceed five percent (5%).
  - Where the conductor length from the panel to the first outlet on a 277-volt circuit exceeds 125 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Conductor size of remaining branch circuit shall increase as needed to meet above voltage drop limitations.
  - Where the conductor length from the panel to the first outlet on a 120-volt circuit exceeds 50 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG. Conductor size of remaining branch circuit shall increase as needed to comply with above voltage drop limitations.
  - Provide associated drawing modifications as needed for compliance with NEC Art 250.122(B) proportional increase in equipment ground conductor wherever ungrounded conductor sizes are increased for voltage drop.

**END OF SECTION 260520**

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**SECTION 260533 - BOXES AND CABINETS****A. GENERAL**

1. The Electrical Contractor shall provide junction boxes, pull boxes, cable, support boxes, and wiring troughs as required by NEC and as otherwise indicated in the Drawings.
2. All necessary mounting hardware and accessories shall be provided for a complete installation.

**B. PRODUCT**

1. Outlet and junction boxes shall be 4" minimum size, octagonal in ceilings, 4" square or rectangular (4" x 4" minimum for walls) except as noted below. Ceiling outlet boxes shall not be less than 1 1/2" deep, but in no case shall the size and depth of boxes be less than the required by the NEC.
2. Outlet boxes shall be equipped with plaster rings of appropriate depth to finish flush with finished walls. Outlets in exposed masonry wall shall be equipped with extra deep square corner tile rings so that box may be installed in the core of the block.
3. Outlets for concealed work and ceiling outlets for exposed work shall be galvanized stamped steel. Boxes shall be as manufactured by Steel City Electric Company, Metropolitan, B & C or equivalent.
4. Wall outlets for exposed conduit work shall be Crouse- Hinds, Appleton, Walker, or equal, series FS and FD switch and receptacle threaded hub boxes, with matching FS and FD covers.
5. Junction boxes for change of direction or feeder taps shall be furnished where required, shall be of adequate size to prevent crowding conductors in accordance with the requirements of the electrical code and job requirements and shall be accessible.
6. Junction boxes on finished wall and ceilings shall be flush with covers.
7. Junction boxes larger than 5" square shall be galvanized and without pre-formed knockouts.

**C. EXECUTION**

1. Boxes and troughs shall be supported independently of conduit entering them. Brackets, threaded rod hangers with lock nuts, bolts, or other suitable supporting methods may be used.
2. Thru-the-wall outlet boxes shall not be permitted. Outlet boxes shown back to back on plans, shall be separate boxes connected where required using a loop of flexible metallic conduit with ground wire. Boxes shall be separated a minimum of 18 inches apart.
3. In general, outlets shall be installed at the heights indicated on the fixture and symbol legend.
4. Each outlet designated on the plans shall be provided with an outlet box.
5. Each outlet box which supports a fixture shall be provided with a fixture stud into the outlet box. Outlet box and/or fixture stud shall be attached with not less than three screws or bolts.
6. Exterior outlets shall be provided with watertight gaskets and covers.

**END OF SECTION 260533**

**SECTION 260545 - CONDUIT AND CONDUIT FITTINGS****A. GENERAL**

1. Conduit shall be delivered to the project site in bundles of full length pipes, each length marked with the trademark of the manufacturer and the Underwriters' Laboratories, Inc. stamp. Each conduit length shall be straight, true and free from scales, blisters, burrs and other imperfections.
2. Within the building parameters and above the floor slab, the rigid steel conduit specified shall be used unless specifically noted otherwise.
3. Conduit size for control wiring shall be a minimum of one-half (1/2) inch conduit. All branch circuit conduit shall be a minimum of one-half (1/2) inch. Percent filled and derating shall be in accordance with the National Electrical Code. Flexible metal and water-tite ("sealtite") conduit in size 1/2" and larger shall be acceptable for motor, appliance, and fixture connections from fixture junction boxes or appliance/motor disconnects provided a ground wire is installed in the flex and the flex assembly is an integral part of the fixture, shipped from the same factory as the fixture, and 3rd party agency approved for such use. The third party agencies shall be amongst those accredited by the NCBCC (North Carolina Building Code Council) to Label Electrical & Mechanical Equipment. This same requirement shall apply for motor/appliance connections.
4. All conduit shall be installed in accordance with the National Electrical Code.
5. Conduit shall be manufactured by Triangle, G.E., Cruse-Hinds, or equivalents.
6. Conduit fittings shall be manufactured by Rayco, T & B, Crouse Hinds, or equivalents.
7. Surface mounted raceway shall be used as noted on the plans in lieu of exposed conduit. Surface mounted raceway shall be manufactured by Wiremold or approved equivalents. A separate ground wire shall be run in the surface mounted raceway.

**B. PRODUCT**

1. Thin Wall Conduit and Fittings
  - a. Electrical metallic tubing (EMT) shall be cold-rolled steel tubing with zinc coating on the outside and protected on the inside by a zinc, enamel or equivalent corrosion-resistant coating conforming to the latest requirements of ANSI. Conduit shall meet the Rigid Conduit Association Standards.
  - b. Electrical metallic tubing fittings shall be all steel plated hexagonal threaded compression type. No pot metal, indenter, or set screw fittings, shall be used. EMT connectors shall have insulated throats.
2. Rigid Steel Conduit and Fittings
  - a. Rigid steel conduit, including elbows and nipples, shall be standard weight, mild steel pipe, hot dipped galvanized, sherardized or zinc-coated conforming to the requirements of ANSI C80.1, 1966 or later edition. Rigid steel conduit shall also meet the latest requirements of Underwriters' Laboratories, Inc. Standards for Rigid Metallic Conduit.

- b. Fittings shall be all steel plated hexagonal threaded fitting.
3. Flexible Metal Conduit and Fittings
    - a. Flexible metal conduit shall be of the best grade interlocking spiral strip steel. The interlocking spiral strip construction shall be such as to permit bending of the conduit to a radius of four (4) times its internal diameter without distorting at any point. The interior and the exterior of the flexible conduit shall be smooth and free of burrs, sharp edges, or other defects which could damage the wire.
    - b. Fittings shall be of the approved types, made of malleable iron and hot dipped galvanized.
    - c. All connectors shall be steel compression fittings with insulated throats.
    - d. Where water tight flexible conduit is required, it shall have an outer sheath of material similar to PVC.
  4. Non-metallic Conduit
    - a. Non-metallic conduit shall be UL listed, for its particular application. It shall be resistant to sunlight and chemical and moisture atmospheres, and rated for use with 90 degrees Celsius conductors.
    - b. The installation and usage of rigid non-metallic conduit shall comply with Article 347 of the National Electrical Code, along with any related or referenced sections.

## C. EXECUTION

1. General
  - a. All conduit shall be run tight against walls, columns or ceilings.
  - b. The conduit shall bend cold 90 degrees about a radius equal to ten (10) times its own diameter without signs of flaw or fracture in either pipe or protective coverings. All bends and offsets shall be made on a forming tool to prevent the conduit or its coating from being damaged in the bending. Conduit bends shall have a radius not less than ten (10) times the conduit diameter.
  - c. Where conduits join any couplings or threaded fittings, the ends shall be made watertight. (All conduit runs, including boxes, couplings, and fittings used therein, shall be so installed and equipped as to prevent water from entering the conduit.)
  - d. All conduits shall be carefully cleaned before and after erection. After cleaning, all ends of conduits shall be free from burrs and inside surfaces shall be free from imperfections likely to injure the wires or cables.
  - e. In every instance, conduit shall be installed in such a manner that the conductors may readily and easily be drawn or pulled in without strain or damage to the insulation; and, also, so that defective conductors may be readily and easily withdrawn and replaced by new conductors. Long radius bends and a sufficient number of approved pull and junction boxes shall be approved for this purpose, and as may be directed by the Engineer. All conduit shall be securely supported and grounded.



- f. In unfinished areas, exposed conduit shall be run to conform to the building lines with special emphasis on neatness. Turns shall be made with galvanized outlet boxes, junction boxes, factory fittings and/or symmetrical bends. Locknuts and bushings shall be employed to provide full grounding and adequate protection of insulation. Double locknuts shall be used on all conduits entering sheet metal enclosures.
  - g. Support for all conduit shall be in accordance with the National Electrical Code. Conduit shall be supported by approved pipe straps or clamps, secured by means of toggle bolts on hollow masonry; expansion shields and matching screws or standard pre-set inserts on concrete or solid masonry, machine screws or bolts on metal surfaces, and wood screws on wood construction. Powder actuated fasteners are not allowed on State projects.
  - h. All empty conduit systems shall be capped or terminated in a junction box and shall be provided with nylon pull cord inside for future use.
  - i. Conduit terminating below grade shall be provided with means to prevent entry of dirt or moisture. Depth of burial shall not be less than two (2) feet below grade. All termination points shall be accurately marked and dimensioned on the As-Built Plans.
  - j. Where conduits of any type pass over a building expansion joint, a standard "expansion joint fitting" compatible with the type of raceway shall be provided.
  - k. Conduits installed on the interior of exterior building walls shall be spaced off the surface a minimum of 1/4" using "clamp-backs" or strut.
2. Thin Wall Conduit and Fittings
- a. Except for service and feeder conduits, electrical metallic tubing and fittings may be installed in lieu of rigid conduit in dry construction in furred spaces, ceiling cavities, chase spaces, interior portions other than concrete and solid plaster, or for exposed work except on mechanical structure or supports.
  - b. Electrical metallic tubing shall not be installed.
    - 1) Where exposed to severe corrosive conditions and/or severe physical damage,
    - 2) Nearer than four (4) feet from finished floor in exposed areas
    - 3) In trade sizes larger than two (2) inches
    - 4) Located in exterior walls or in poured concrete.
    - 5) Any location outdoors.
    - 6) Where tubing, coupling, elbows and fittings would be in direct contact with the earth or underground (in/below slab-on-grade or in earth).
  - c. A transition between a run of rigid conduit concealed in a wall and a run of thin wall conduit along a ceiling shall be made in an outlet box above the ceiling, if accessible, near the wall.
3. Rigid Steel Conduit and Fittings

- a. All conduit terminations shall be provided with insulating bushings.
  - b. Condulet fittings shall not be used in lieu of pull boxes.
  - c. Except where located under the ground floor slab, all service and feeder conduit shall be heavy wall (rigid galvanized).
  - d. Rigid steel conduit shall be installed in exterior masonry walls, in wet locations where subject to severe physical damage, or where conduit trade size is two and one half (2 1/2) inches or larger.
4. Flexible Metal Conduit and Fittings
- a. Flexible metallic conduit shall be provided at the end of each conduit run terminating at the conduit box on electric motors, transformers or other equipment.
  - b. The length of flexible conduit shall be in accordance with the National Electric Code.
5. Non-Metallic Conduit
- a. Thin wall rigid non-metallic conduit (schedule 40 PVC) shall only be used for concrete encasement.
  - b. Except where embedded in concrete, conduit shall be supported to permit adequate lineal movement to allow for expansion and contraction of conduit due to temperature change. Where a temperature change in excess of 14 degrees Celsius is anticipated, such as direct burial, exposed outside of the building, or in un-insulated spaces inside the building (attics, crawl spaces, etc.), expansion joints shall be installed in accordance with the manufacturer's specifications.
  - c. Heavy wall non-metallic conduit (schedule 80 PVC) shall be used where conduits are direct buried exterior to the building or exposed exterior to the building.
  - d. PVC schedule 40 shall not be used exposed or concealed in gypsum wall, but may be used in CMU walls. PVC schedule 40 may be used in elevated floor slabs and in foundation slabs. Minimum concrete cover shall be 3/4 inch at finished or formed surface and shall be 3 inches at concrete surface cast against earth or for slabs placed on-grade. Greater amounts of concrete cover shall be used in areas subject to damage. The placement of conduit in floor slabs must be thoroughly coordinated with the structural design. Potential conflicts with steel reinforcing bars and reductions in net concrete sections are among the issues that must be considered by the structural engineer.
6. Underground Raceways
- a. Where conduit is installed under the ground floor slab within the building foundations, schedule 40 PVC conduit shall be used. At the Contractor's option, this installation may consist of galvanized steel conduit encased with three (3) inches of concrete or rigid steel conduit with a minimum of 15 mils of PVC coating. Where thin wall non-metallic conduit is used under the ground floor slab, the elbows and turn out required to turn the raceway up into cabinets, equipment, boxes, etc. shall be of rigid steel.

- b. Raceways run external to building foundation walls, with the exception of branch circuit raceways, shall be encased with a minimum of three (3) inches of concrete on all sides.
  - 1) Encased raceways must have a minimum cover of eighteen (18) inches, except for raceways containing circuits with voltages above 600 volts, which must have a minimum cover of thirty (30) inches.
  - 2) Encased raceways shall be of a type approved by the NEC as "suitable for concrete encasement."
- c. Branch circuit raceways run underground external to building foundation walls shall be run in raceways installed in accordance with the NEC, and shall be of a type approved by the NEC as "suitable for direct burial." Minimum raceway size shall be 1 inch.
- d. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6 to 8 inches below finished grade. Tape shall be permanent, bright-colored, continuous printed, plastic tape compounded for direct burial not less than 6 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below.
- e. Raceways run underground internal to building foundation walls shall be of a type and installed by a method approved by the NEC.
- f. Where underground raceways are required to turn up into cabinets, equipment, etc., and on to poles, the elbow required and the stub-up out of the slab or earth shall be of rigid steel.
- g. The raceway system shall not be relied on for grounding continuity.
- h. Where passing through a "below grade" wall from a conditioned interior building space, raceways shall be sealed utilizing fittings similar and equal to OZ/GEDNEY type "FSK" thru-wall fitting with "FSKA" membrane clamp adapter if required.

**END OF SECTION 260545**

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## **SECTION 260553 – ELECTRICAL IDENTIFICATION**

### **A. GENERAL**

1. Furnish and install engraved laminated phenolic nameplates for all safety switches, panelboards, transformers, switchboards, motor control centers and other electrical equipment supplied for the project.
2. Furnish and install self-adhesive plastic tape for all receptacle and wall switch cover plates indicating circuit numbers.

### **B. PRODUCT**

1. Nameplates:
  - a. Nameplates shall remain legible. Embossed, self-adhesive plastic tape is not acceptable for marking equipment.
  - b. Letters shall be approximately 1/2-inch high except where resultant nameplate size exceeds equipment size. Nameplate lettering may be adjusted accordingly with approval of the Engineer.
  - c. Nameplate material colors shall be:
    - Blue surface with white core for 120/208-volts equipment.
    - Black surface with white core for 277/480-volts equipment.
    - Bright red surface with white core for all equipment related to fire alarm system.
    - Dark red (burgundy) surface with white core for all equipment related to security.
    - Green surface with white core for all equipment related to emergency systems<sup>1,2</sup>.
    - Orange surface with white core for all equipment related to telephone systems.
    - Brown surface with white core for all equipment related to data systems.
    - White surface with black core for all equipment related to paging systems.
    - Purple surface with white core for all equipment related to TV systems.
2. Self-adhesive plastic tape:
  - a. All text shall be type written by the tape compatible equipment. No handwritten.

### **C. EXECUTION**

1. Nameplates shall be securely attached to equipment using two-part epoxy adhesive suitable for location where installed. The Designer may specify attaching with self-tapping stainless-steel screws; if the screw sharp end is protected; or rivets. In outdoor locations, labels applied using two-part epoxy shall be weatherproof and sunlight resistant.

2. Designer shall confirm with the Owner identification of other systems, such as Legally Required and Optional Standby systems.  
Notes
  - a. Emergency systems are those defined by NEC Art 700; legally required and optional standby systems (defined under NEC Art 701 and 702 respectively) shall not be uniquely identified and shall retain the nameplate color consistent with their system voltage, i.e. blue for 120/208-volt and black for 277/480-volt.
  - b. Identification of the essential electrical system within Health Care Facilities (defined by NEC Art 517) shall be coordinated with the Facility Owner and compliant with NFPA 99.
3. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by tags with string or wire attached to conduit or outlet.
4. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match the surface color scheme outlined above. This includes covers on boxes above lift-out and other type accessible ceilings, where identification shall also include branch circuit designation.
5. The State Construction Office acknowledges certain existing state facilities may have been constructed under previous guidelines and policies having different equipment identification. Therefore, the Designer shall be responsible for confirming any identification system that differs from current guidance and obtaining direction from SCO as to the identification system to be implemented for any existing electrical systems that are retrofitted or modified.

**END OF SECTION 260553**

## **SECTION 262416 - PANEL BOARDS AND CIRCUIT BREAKERS**

### **A. GENERAL**

1. The Electrical Contractor shall provide all panelboards and circuit breakers as shown on the plans in accordance with this specification.
2. All equipment shall meet UL, NEC and NEMA Standards as applicable to the equipment specified herein.
3. All panelboards shall be equipped with a main circuit breaker or main lugs as indicated on the drawings.
4. All panelboards shall be equipped with branch breakers as shown on the drawings.
5. All panelboards identified on the drawings for use as service equipment shall be so labeled and UL listed for such use.
6. Full size insulated copper neutral bars shall be included in all panelboards. Neutral busing shall have a suitable lug for each outgoing feeder requiring a neutral connection.
7. A copper ground bus shall be included in all panelboards.
8. All current-carrying parts of the bus assembly shall be copper with tin plating.
9. Panelboards shall be labeled with a UL short circuit rating not less than the rating indicated on the drawings.
10. The word "spare", unless noted otherwise on the panel schedules, shall be a single pole, 20 amp circuit breaker.
11. The word "space", unless noted otherwise on the panel schedules, shall be for a space in the panelboard for a standard size, single pole circuit breaker.
12. Terminals for feeder conductors to the panelboard mains and neutral shall be UL listed as suitable for the type of conductor specified. Terminals for branch circuit wiring, both breaker and neutral, shall be UL listed as suitable for the type of conductor specified.
13. Sub fed breakers are not acceptable.
14. Series rated panel boards or breakers are not acceptable.
15. All NEMA 1 panel boards shall have a hinged trim (Door in Door).
16. All panelboards shall have breakers, terminals, and Lugs UL approved use with 75°C rated conductors.

## B. PRODUCT

1. This section shall be for panelboards whose characteristics shall not exceed the following:

Voltage	=	240	Maximum Branch Circuit	=	125 amps
Amps	=	600	Short Riding Circuit	=	22,000 amps

- a. Panelboards shall be Square D Company type NQ (bolt- on) or equivalent by Siemens, Eaton, or GE by ABB.
  - b. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.
  - c. The panelboard bus assembly shall be enclosed in a steel cabinet. The size of the wiring gutters and gauge of steel shall be in accordance with NEMA, UL and National Electrical Code requirements for panelboards. The box shall be fabricated from galvanized steel or equivalent rust-resistant steel. Surface mounted cans shall be galvanized and without preformed knockouts.
  - d. Fronts shall include doors and have flush, brushed stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. The flush lock shall not protrude beyond the front of the door. All panelboard locks shall be keyed alike. Door shall be mounted by completely concealed steel hinges. A circuit directory frame with a clear plastic covering and a directory card shall be provided on the inside of the door. Fronts shall be of code gauge, full finished steel with rust-inhibiting primer and baked enamel finish.
  - e. Panelboard trims shall cover all live parts. Switching device handles shall be accessible.
2. Molded Case Circuit Breakers
    - a. This specification covers molded case circuit breakers rated 15 through 1200 amperes 120VAC, 240VAC, 277VAC and 480VAC. Breakers covered under this specification may be installed in switchboards, panelboards, motor control centers, combination motor starters, busway plugs and individual enclosures.
    - b. Circuit breakers shall be manufactured by Square D Company of the size as indicated on the drawings or equivalent by Siemens or General Electric. All breakers shall be bolt-on type.
    - c. All circuit breakers shall have a quick-make, quick- break over center toggle type mechanism. The handle mechanism shall be trip-free to prevent holding contacts closed against a short circuit or sustained overload. All circuit breakers shall assume a position between on and off when tripped automatically. Multi- pole circuit breakers shall be common trip such that an overload or short circuit on any one pole will result in all poles opening simultaneously. Arc extinction is to be accomplished by magnetic arc chutes. All ratings shall be clearly visible.
    - d. Automatic operation of all circuit breakers shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. Circuit breakers shall be calibrated to carry 100% rated current in an ambient of 40 degrees Celsius. Circuit breakers shall be ambient compensating in that, as the ambient temperature increases over 40 degrees



Celsius, the circuit breaker automatically derates itself so as to better protect its associated conductor. The instantaneous magnetic trip shall be adjustable and accessible from the front of all circuit breakers on frame sizes 250 amps and above.

- e. The interrupting rating of each circuit breaker shall be as indicated on the drawings. The interrupting rating of the circuit breakers shall be at least equal to the available short circuit current at the line terminals of the circuit breaker and correspond to UL listed integrated short circuit current rating specified for the panelboards and switchboards.
- f. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120 V ac branch circuits as specified on the plans or panelboard schedule. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional single pole circuit breaker.
- g. Motor starters, and other applications as indicated on drawings, shall be furnished with magnetic-only type molded case circuit breakers. Each breaker shall be provided with a single magnetic adjustment that will set all poles to the same trip current. Adjustment shall be continuous throughout the adjustable trip range. The magnetic trips shall be accessible from the front of these circuit breakers.

### **C. EXECUTION**

- 1. Panelboards shall be flush or surface mounted as shown on the plans.
- 2. Panel enclosures shall not be used as junction or pull boxes for splicing conductors.
- 3. Each flush mounted panel shall be equipped with two empty one inch conduits sealed in the wall from a panel to a six inch square flush mounted box installed above a lay-in type ceiling or flush in the wall at the ceiling for a plaster or spline type acoustical tile ceiling.
- 4. All panels shall be equipped with neatly typed directory cards attached on the inside of the door.
- 5. GFI circuits shall be tested by the Contractor prior to the pre-final inspection.
- 6. Testing shall be performed by a qualified factory technician at the job site. All readings shall be tabulated by the contractor.
- 7. The number of branch circuit shall be identified with permanent wire tag attached to the wire.

**END OF SECTION 262416**

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## **SECTION 262726 - WIRING DEVICES**

### **A. GENERAL**

1. Switches, dimmer switches, photocell, contactors and receptacles, with proper cover plates, shall be provided where indicated on the Drawings.

### **B. PRODUCT**

1. Switches, dimmer switches, photocell, contactors and receptacles shall be as specified in the Symbol Schedule of the Drawings.
2. All switches and receptacles shall be federal specification grade meeting NEMA WD 1, NEMA WD 6, DSCC W-C-596G, and UL-498 and shall be approved third-party listed.
3. Switches and receptacles shall be as manufactured by Hubbell, Pass and Seymour, or Leviton. Photocells shall be manufactured by Tork, Paragon, Bryant, or equivalent.
4. Cover plates for all wall mounted devices shall be provided as scheduled on the Drawings. Where covers are not specified, they shall be as follow:
  - a. Interior: type 302 stainless steel. Cover plate mounting screws shall be slotted head oval screws and shall match the finish and material of the plate, and shall be furnished with the plate by the plate manufacturer.
  - b. Exterior, exposed work and wet locations: cover plates shall be extra-duty rated (NEC 406.9(B)(1)) galvanized cast ferrous metal, standard size, and shall be single or ganged as indicated on the drawings. Exterior mounted switch and receptacle plates, and those noted to be weatherproof, shall be weatherproof cover plates, standard size, single or ganged as indicated on the drawings, and shall be "approved" third party listed as "rain-tight while in use."
5. All devices shall have a hex-head green grounding screw for use in connecting device to green grounding conductor run in the conduit system.
6. All GFI devices shall be the feed through type.
7. All standard duplex receptacles shall be 20 amp, 125 volt rated.
8. All devices subject to use in a wet location shall be listed as weather resistant.
9. All switches shall be rated 20 amp, 120/277 volt. Toggle switches shall have quiet operating mechanisms without the use of mercury switches.

**C. EXECUTION**

1. Mounting height shall be as indicated on the Drawings. Coordinate with other trades so that devices will miss equipment installed by others.
2. Where two or more devices are ganged, they shall be in a common box with a ganged plate.
3. All devices shall have a green ground conductor to run parallel with the phase conductor back to the electrical panel.
4. In all areas where carpet is to be installed as finished floor material, unless otherwise specified, the Electrical Contractor will furnish solid brass carpet flanges for installation on floor outlet boxes. Flanges will be furnished and installed on all active outlets after the carpet is installed. Where a specified number of outlet fittings are to be furnished to the Owner, for each fitting not installed during the construction period, it will be turned over to the Owner with the receptacle, carpet flange and all necessary appurtenances.
5. All receptacles mounted above counters, backsplashes shall be mounted horizontally unless otherwise noted on plan.
6. Provide quantity of 2% spare cover plates of each type to the owner.

**END OF SECTION 262726**

## **SECTION 262727 – DISCONNECTS**

### **A. GENERAL**

1. Disconnect switches shall be provided where indicated on the drawings, or as required by the National Electrical Code (NEC).

### **B. PRODUCT**

1. Disconnects shall be heavy duty as manufactured by Square D Company, Siemens, Eaton, GE by ABB, or approved equivalent.
2. Disconnects shall be furnished with factory finish paint and appropriate knockouts for 1 where installed indoors. NEMA 3R enclosures shall be provided where exposed to the elements, unless noted otherwise.
3. All disconnects shall have copper bus.
4. Disconnects shall have provisions for locking in on and off positions.
5. Disconnects shall have defeatable door interlocks that prevent the door from opening when the operating handles is in the “on” position.
6. Disconnects shall have handles whose positions are easily recognizable in the “on” or “off” position. For safety reasons, padlock shall be provided for switches located in the public areas.

### **C. EXECUTION**

1. Disconnect switches shall be mounted as indicated on the Drawings and shall be independently supported. Conduits entering the disconnect switch shall not be used to support switches.
2. Where fused disconnect switches are required or shown on the plans, standard Fusetron fuses shall be used unless the switch protects an individual motor circuit, then dual element Fusetron fuses shall be used.
3. The electrical contractor shall provide to the owner the spare fuses, 10% of the quantity of fuses used of each type and rating, with a minimum of one set of each type.

**END OF SECTION 262727**

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## SECTION 265100 - LIGHTING FIXTURES

### A. GENERAL

1. The Contractor shall provide all fixtures and lamps where indicated on the Drawings.
2. Work shall include all stems, canopies and accessories necessary for a complete lighting fixture installation.
3. No PCB ballasts shall be accepted.
4. All lighting systems shall comply with the 2018 North Carolina State Energy Code and North Carolina Senate Bill 1946 and G.S. 143-64.17.

### B. PRODUCT

1. Fixtures shall be as specified in the Fixture Schedule on the Drawings or approved equivalents.
2. All outdoor fixtures shall bear the approved third party test label for damp or wet locations as applicable. Where the ambient falls below 50°F that all fluorescent lamps and ballasts shall be rated for operation at 0°F.
3. Unless otherwise noted, all fixtures shall be new, free of defects and imperfections. Damaged fixtures shall be replaced at this Contractor's expense.
4. All acrylic lenses for lay-in troffers and wrap around fixtures shall have a nominal lens thickness of 0.125" unless noted otherwise on plans.
5. LED Luminaries:
  - a. LED driver manufacturers should have a minimum of five years of experience with the manufacture of LED drivers. All drivers shall have a minimum warranty of five years.
  - b. Where dimming is required, fixtures shall be dimmable down to 1% with standard 120/277 volt, electronic, low voltage dimmers.
  - c. Minimum color rendering index (CRI) shall be 80. Color temperature and performance shall conform to the parameters established by ENERGY STAR SSL standards (refer to ANSI-C78.377-2008).
  - d. Optical design shall be low glare, 50% cut-off.
  - e. Rated for 50,000 hours at 70% lumen maintenance.
  - f. LED driver shall be high efficiency with a minimum power factor of .90
  - g. 5 year, 100% warranty coverage for the driver, LED module, housing and trim. For the 1<sup>st</sup> year this shall be a complete parts and labor warranty. The 4th and 5th years shall cover parts only.
  - h. Total harmonic distortion: ≤ 20% (at full luminaire output and across specified voltage range)

- i. Transient and surge protection: ANSI C62.41-2002 Category A surge protection standards up to and including 2.5 kV for interior fixtures.
  - j. Sound: Class A not to exceed a measured value of 24dB.
  - k. Maximum standby power: 1W
  - l. LED arrays in the product(s) will be considered defective in material or workmanship if a total of 10% or more of the individual light-emitting diodes in the product(s) fail to illuminate during normal operation after installation.
6. Emergency Exit Lights per the State Construction Office requirements.

It shall be completely self-contained, provided with maintenance-free battery, automatic charger, and other features. Luminaire must be third-party listed as emergency lighting equipment, and meet or exceed the following standards; NEC, N.C. Building Code, Energy Code, NFPA-101, and NEMA Standards.

a. Battery

It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degree C to 60 degrees C and contain a resealable pressure vent, a sintered + positive terminal and – negative terminal.

b. Charger

It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80 percent. A low voltage disconnect switch shall be included if LEAD Battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

c. Additional Features

Pilot light to indicate the unit is connected to AC power. The battery shall have high rate charge pilot light, unless self-diagnostic type. A test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer rely.

d. Warranty

The entire unit shall be warranted for three years. The battery must have an additional two more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contract document.

e. LED

The use of LED is required due to their reliable performance, low power consumption, and limited maintenance requirements. Maximum LED failure rate shall be 25% within a seven (7) year period; otherwise, if exceeded, manufacturer shall replace the complete unit at no charge to the owner.



f. Unit Test

Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes, in accordance with NEC 700. The battery test shall be done 10 days prior to final inspection by the State Construction Office. Any unit which fails the test must be repaired or replaced, and tested again. Copy of the test report shall be included with the project record documentation.

7. Emergency Lights per the State Construction Office requirements

Shall be completely self-contained, provided with maintenance-free 12 volt battery, automatic charger, two lamps and other features. Fixture shall be third party listed as emergency lighting equipment, and meet or exceed the following standards: NEC, N.C. Building Code, UL 924, NC Energy Code, NFPA-101, and NEMA Standards.

a. Additional Features

Pilot light to indicate the unit is connected to AC power. The battery shall have high rate charge pilot light, unless self-diagnostic type. A test switch to simulate the operation of the unit upon loss of AC power by energizing the lamps from the battery. This simulation must also exercise the transfer rely. If fluorescent emergency unit is used, a LED charging indicator light must be easily visible after installation and a remote test switch shall be installed adjacent to the fixture.

b. Battery

It shall be sealed, maintenance-free type, with minimum of 90 minutes operating endurance. Must have a normal life expectancy of 10 years. Batteries shall be a high temperature type with an operating range of 0 degrees C to 60 degrees C and contain a resealable pressure vent, a sintered + positive and -negative terminal.

c. Charger

It shall be fully automatic solid state type, full wave rectifying, with current limiting. Charger shall restore the battery to its full charge within 24 hours after a discharge of 90 minutes under full rated load. The unit shall be activated when the voltage drops below 80%. A low voltage disconnect switch shall be included in LEAD battery is used, to disconnect the battery from the load and prevent damage from a deep discharge during extended power outage.

d. Warranty

The entire unit shall be warranted for three years. The battery must have an additional two more years pro-rated warranty. Warranty shall start from the date of project final acceptance. Warranty shall be included in the contact document.

e. Unit Test

Contractor shall perform a test on each unit after it is permanently installed and charged for a minimum of 24 hours. Battery shall be tested for 90 minutes, in accordance with NEC 700. The battery test shall be done 10 days prior to final inspection by the State Construction Office. Any unit which fails the test must be repaired or replaced, and tested again. Copy of the test report shall be included with the project record documentation.

**C. EXECUTION**

1. All fixtures shall be installed in accordance with the National Electric Code.
2. All fixtures other than the lay-in type shall be individually supported from building structure with 1/4" threaded rods and nuts.
3. Where a recessed or downlight fixture replaces a section or part of a ceiling tile, fixture is to be supported at the two (2) opposite ends to the steel frame of the building. Supports shall be provided with the same type of wire as used to support the lay-in ceiling track. Attach one end of the wire to one corner of the luminaire and the other end to the building's structural system. The lay-in luminaire shall then be screwed to the main runners of the lay-in ceiling track at all four (4) corners using sheet metal screws. For fire rated suspended ceiling, luminaire shall be supported to the Building Structure as per the Ceiling Design Criteria, luminaire shall then be screwed to the main runners of the suspended ceiling track at all four (4) corners using sheet metal screws.
4. The complete emergency lighting system shall be tested by throwing the circuit breakers feeding the emergency lighting circuits. One and one-half hours thereafter, the battery voltages shall be recorded in a report to be submitted to the Engineer. This test shall be performed just prior to final inspection, under witness of the state electrical inspector, and in accordance with NEC Articles 700.4 (A) and (D).

**END OF SECTION 265100**

**SECTION 31 05 13**  
**SOILS FOR EARTHWORK**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Subsoil materials.
  - 2. Topsoil materials.
  
- B. Related Sections:
  - 1. Section 31 05 16 - Aggregates for Earthwork.
  - 2. Section 31 22 13 - Rough Grading.
  - 3. Section 31 23 17 - Trenching.
  - 4. Section 31 23 23 - Fill.
  - 5. Section 31 25 13 - Erosion Controls: Slope protection and erosion control.
  - 6. Section 31 37 00 - Riprap.
  - 7. Section 32 91 19 - Landscape Grading.
  - 8. Section 32 92 19 - Seeding and Soil Supplements.
  - 9. Section 32 92 23 - Sodding.
  - 10. Section 32 93 00 - Plants.
  - 11. Section 33 46 00 - Subdrainage: Filter aggregate.
  - 12. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

**1.2 UNIT PRICES - MEASUREMENT AND PAYMENT**

- A. Subsoil:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes excavating existing subsoil, supplying subsoil materials and stockpiling.
  
- B. Topsoil:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes excavating existing topsoil, supplying topsoil materials, stockpiling and re-spreading of topsoil.

**1.3 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).

2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

#### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in airtight containers, four, 20-lb samples of each type of proposed fill material to Engineer.
- C. Materials Source: Submit name of imported materials source.
- D. Manufacturer's Certificate(s): Certify that subsoil and/or topsoil products meet or exceed specified requirements.

#### **1.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

#### **1.6 QUALITY ASSURANCE**

- A. Furnish each subsoil and/or topsoil material from single sources, respectively, throughout the Work.
- B. Sustainable Design Requirements:
  1. Recycled Content Materials: Furnish materials with recycled content, where feasible.
  2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform all Work in accordance with Local government and NCDOT standards.

## **2.1 SUBSOIL MATERIALS**

- A. Subsoil Type S1 – In Situ Material: Conforming to Local government and NCDOT standards and in compliance with Geotechnical Engineering report.
- B. Subsoil Type S2 – Fill and Backfill Material:
  - 1. Excavated and re-used material; select or local borrow; structural. In compliance with Geotechnical Engineering report.
  - 2. Graded.
  - 3. Free of organics and debris with a low- to moderate-plasticity soil. A liquid limit less than 60 and a plasticity index less than 30 or a granular material with at least 15% fines (silt or clay).

## **2.2 TOPSOIL MATERIALS**

- A. Topsoil Type S3 – Landscape Material: Conforming to Local government and NCDOT standards.
  - 1. Excavated and reused material.
  - 2. Graded.
  - 3. Free of roots, rocks larger than 1/2-inch, subsoil, debris, large weeds and foreign matter.
    - a. Screening: Single screened.
- B. Topsoil Type S4 – Athletic Fields:
  - 1. Imported borrow.
  - 2. Fertile, friable, natural loam surface soil or equivalent.
  - 3. Reasonably free of slag, cinders, stones, soil clods, sticks, roots, trash or other extraneous materials larger than 1-inch in diameter.
    - a. Screening: Double screened.
  - 4. Free of Kudzu, quack grass, Johnson grass, nut sedge, poison ivy and other objectionable weed plants or plant parts.
  - 5. Acidity range (pH) of 5.5 to 7.5.
  - 6. Containing maximum 20% subsoil in admixture.

## **2.3 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D698.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D698.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from the same source throughout the Work.

### **3.1 EXCAVATION**

- A. Excavate subsoil and topsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.
- C. Remove excess excavated materials, subsoil and topsoil, not intended for reuse from site.
- D. Remove excavated materials not meeting requirements for subsoil materials and topsoil materials from site.

### **3.2 STOCKPILING**

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8-feet high maximum.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- G. Stockpile any potentially hazardous materials on impervious material. Cover to prevent erosion and leaching until disposed of.

### **3.3 STOCKPILE CLEANUP**

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent freestanding surface water.
- B. If borrow area is indicated, leave area in clean and neat condition. Grade site surface to prevent freestanding surface water.

**END OF SECTION**

## SECTION 31 05 16

### AGGREGATES FOR EARTHWORK

#### PART 4 GENERAL

##### 4.1 SUMMARY

- A. Section Includes:
1. Coarse aggregate materials.
  2. Fine aggregate materials.
- B. Related Sections:
1. Section 31 05 13 - Soils for Earthwork: Fill and grading materials.
  2. Section 31 22 13 - Rough Grading.
  3. Section 31 23 17 - Trenching.
  4. Section 31 23 23 - Fill.
  5. Section 31 25 13 - Erosion Controls: Slope protection and erosion control.
  6. Section 31 37 00 - Riprap.
  7. Section 32 11 23 - Aggregate Base Courses.
  8. Section 32 91 19 - Landscape Grading.
  9. Section 33 41 00 - Storm Utility Drainage Piping.
  10. Section 33 46 00 - Subdrainage: Filter aggregate.
  11. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

##### 4.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Aggregate:
1. Basis of Measurement: By ton.
  2. Basis of Payment: Includes supplying aggregate materials, stockpiling.

##### 4.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
  2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).

4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

#### **4.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in airtight containers, four, 20-lb samples of each type of proposed aggregate fill material to Engineer.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify that aggregate products meet or exceed specified requirements.

#### **4.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

#### **4.6 QUALITY ASSURANCE**

- A. Furnish each aggregate material from single source throughout the Work.
- B. Sustainable Design Requirements:
  1. Recycled Content Materials: Furnish materials with recycled content, where feasible.
  2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform all Work in accordance with Local government and NCDOT standards.



### **5.1 COARSE AGGREGATE MATERIALS**

- A. All gradations of coarse aggregate materials referred to on site drawings utilize the nomenclature established by the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. All fine aggregate materials to be used shall conform to these standards and to any issued by the Municipality, as applicable.

### **5.2 FINE AGGREGATE MATERIALS**

- A. All gradations of fine aggregate materials referred to on site drawings utilize the nomenclature established by the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. All fine aggregate materials to be used shall conform to these standards and to any issued by the Local government, as applicable.

### **5.3 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing and inspection services.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- D. When tests indicate materials do not meet specified requirements, change material and re-test.

## **PART 6 EXECUTION**

### **6.1 EXCAVATION**

- A. Remove excess excavated materials not intended for reuse, from site.
- B. Remove excavated materials not meeting requirements for coarse aggregate materials and fine aggregate materials from site.

### **6.2 STOCKPILING**

- A. Stockpile materials on site at locations designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

- E. Stockpile any potentially hazardous materials on impervious material. Cover to prevent erosion and leaching until disposed of.

### **6.3 STOCKPILE CLEANUP**

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent freestanding surface water.

**END OF SECTION**

## **SECTION 31 10 00**

### **SITE CLEARING**

#### **PART 7 GENERAL**

##### **7.1 SUMMARY**

- A. Section Includes:
  - 1. Removing surface debris.
  - 2. Removing designated paving, curbs, and misc. concrete.
  - 3. Removing designated trees, shrubs, and other plant life.
  - 4. Removing abandoned utilities.
  - 5. Excavating topsoil.
  
- B. Related Sections:
  - 1. Section 02 41 16 - Structure Demolition: Removing underground storage tanks and designated utilities.
  - 2. Section 31 22 13 - Rough Grading.
  - 3. Section 31 23 18 - Rock Removal.

##### **7.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Site Clearing:
  - 1. Basis of Payment: Includes clearing site, loading and removing waste materials from site, applying herbicide to designated plant life.

##### **7.3 SUBMITTALS**

- A. None required.

##### **7.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with Local, State and Federal Standards.
- B. Conform to State & Federal code for environmental requirements.

#### **PART 8 PRODUCTS**

Not Used.

##### **8.1 MATERIALS**

Not Applicable.

### **9.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.

### **9.2 PREPARATION**

- A. Call ULOCO not less than two working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

### **9.3 PROTECTION**

- A. Locate, identify, and protect utilities indicated to remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping per plans.
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

### **9.4 CLEARING**

- A. Clear areas required for access to site and execution of Work.
- B. Remove trees and shrubs, stumps, root systems as required.
- C. Clear undergrowth and deadwood, without disturbing subsoil..

### **9.5 REMOVAL**

- A. Remove debris, rock, and extracted plant life from site.
- B. Remove paving, curbs, and misc. concrete.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

### **9.6 TOPSOIL EXCAVATION**

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding eighteen feet and protect from erosion.
- D. Remove excess topsoil not intended for reuse, from site.
  - 1. All areas not covered by building and/or parking shall receive four inches of topsoil. No grass shall be seeded, sprigged or sodded in clay base.

**END OF SECTION**



## **SECTION 31 22 13**

### **ROUGH GRADING**

#### **PART 10 GENERAL**

##### **10.1 SUMMARY**

- A. Section Includes:
  - 1. Excavating topsoil.
  - 2. Excavating subsoil.
  - 3. Cutting, grading, filling, rough contouring and compacting site for site facilities, building pads and transportation areas.
  
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  - 2. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  - 3. Section 31 10 00 - Site Clearing: Excavating topsoil.
  - 4. Section 31 23 16 - Excavation: Building excavation.
  - 5. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
  - 6. Section 31 23 23 - Fill: General building area backfilling.
  - 7. Section 31 25 13 - Erosion Controls: Slope protection and erosion control.
  - 8. Section 32 91 19 - Landscape Grading: Finish grading with topsoil to contours.

##### **10.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Topsoil Fill Material:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes, at minimum, excavating existing soil, supplying soil materials, stockpiling, scarifying substrate surface, placing where required and compacting.
  
- B. Subsoil Fill Material:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes, at minimum, excavating existing subsoil, supplying subsoil materials, stockpiling, scarifying substrate surface, placing where required, and compacting.
  
- C. Structural Fill Material:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes excavating existing subsoil, supplying structural fill materials, stockpiling, scarifying substrate surface, placing where required and compacting.
  
- D. Granular Fill Material:
  - 1. Basis of Measurement: By the cubic yard.

2. Basis of Payment: Includes, at minimum, supplying granular fill materials, stockpiling, scarifying substrate surface, placing where required, and compacting.

### 10.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
  1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3  - 3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  - 4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3  - 5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  - 6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
  - 7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
  - 8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).</sup></sup>

### 10.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, four, 10-lb samples of each type of fill to Engineer for testing.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify that all materials meet or exceed the aforementioned ASTM standards and the requirements of the Local government & NCDOT, as applicable.

### 10.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.



- b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

## **10.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

## **10.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with ASTM C136, ASTM D2419 and ASTM D2434.
- B. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform all Work in accordance with NCDOT and Local government Standards, as applicable.

## **PART 11 PRODUCTS**

### **11.1 MATERIALS**

- A. Topsoil: Type S3 as specified in Section 31 05 13.
- B. Subsoil Fill: Type S2 as specified in Section 31 05 13.
- C. Structural Fill: As referenced in Section 31 05 16.
- D. Granular Fill: As referenced in Section 31 05 16.

## **PART 12 EXECUTION**

### **12.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify site conditions, survey bench mark and intended elevations for the Work are as indicated on Drawings.

**12.2 PREPARATION**

- A. Call Local Utility Line Information service at (800) 632-4949 not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify appropriate utility company to remove or relocate utilities, as necessary.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- F. Protect benchmarks, survey control points and all existing features designated to remain from excavating equipment and vehicular traffic.

**12.3 TOPSOIL EXCAVATION**

- A. Excavate topsoil from the entire site without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile in area designated on site to depth not exceeding 8-feet and protect from erosion.
- D. Remove excess topsoil not intended for reuse, from site.

**12.4 SUBSOIL EXCAVATION**

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Do not excavate wet subsoil.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Stockpile subsoil in area designated on site to depth not exceeding 8-feet and protect from erosion.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.
- G. Stability: Replace damaged or displaced subsoil as specified for fill.

**12.5 FILLING**

- A. Fill areas to contours and elevations with unfrozen materials.

- B. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 12-inches compacted depth.
  - 2. Structural Fill: Maximum 8-inches compacted depth.
  - 3. Granular Fill: Maximum 8-inches compacted depth.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building at minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Repair or replace items indicated to remain damaged by excavation or filling.
- G. Install Work in accordance with all applicable North Carolina and Local government standards.

## 12.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Sub-grade: Plus or minus 1/10 foot from required elevation.

## 12.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557, ASTM D698 and/or AASHTO T180, as applies.
- C. Perform in place compaction tests in accordance with the following, as applies:
  - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**END OF SECTION**



## SECTION 31 23 16

### EXCAVATION

#### PART 13 GENERAL

##### 13.1 SUMMARY

- A. Section Includes:
  - 1. Soil densification.
  - 2. Excavating for building foundations.
  - 3. Excavating for paving, roads and parking areas.
  - 4. Excavating for slabs-on-grade.
  - 5. Excavating for site structures.
  - 6. Excavating for landscaping.
  
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork: Stockpiling excavated materials.
  - 2. Section 31 05 16 - Aggregates for Earthwork: Stockpiling excavated materials.
  - 3. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
  - 4. Section 31 23 17 - Trenching: Excavating for utility trenches.
  - 5. Section 31 23 23 - Fill.
  - 6. Section 31 25 13 - Erosion Controls: Slope protection and erosion control.
  - 7. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

##### 13.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Excavating Soil Materials:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes general excavating to required elevations, loading and placing materials in stockpile and/or removing materials from site. (Over Excavating: Payment will not be made for over excavated work nor for replacement materials.)

##### 13.3 REFERENCES

- A. ASTM International:
  - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  - 3. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  - 4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

- B. Local utility standards when working within 24 inches of utility lines.

#### **13.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Shop Drawings: Indicate soil densification grid for each size and configuration footing requiring soils densification.

#### **13.5 QUALITY ASSURANCE**

- A. Perform all Work in accordance with Local government and NCDOT standards.

#### **13.6 QUALIFICATIONS**

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of North Carolina.

### **PART 14 PRODUCTS**

Not Used.

### **PART 15 EXECUTION**

#### **15.1 PREPARATION**

- A. Call Local Utility Line Information service at 800-632-4949 not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify appropriate utility company to remove or relocate utilities, as necessary.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- F. Protect benchmarks, survey control points and all existing features designated to remain from excavating equipment and vehicular traffic.

#### **15.2 SOIL DENSIFICATION - VIBRO-COMPACTION**

- A. Vibro-compact substrates below footing bearing surfaces for footings as indicated on Drawings before excavating site.

- B. Densify existing subsoils with relative density rating of compact to dense to attain relative density rating of very dense.
  - 1. Densify subsoils to depth of feet.
- C. Densification Equipment:
  - 1. Depth Vibrator: Poker type with follower tubes with visible marking every 12 inches to enable insertion depth measurement.
  - 2. Motion: radial in horizontal plane.
  - 3. Data Acquisition System: Record amps or pressure of the vibrator motor over time and depth.
- D. Perform densification in presence of Geotechnical Engineer directly under each footing with vibrator inserted in grid pattern at maximum 6 feet on center.
  - 1. Arrange compaction grid for each footing for maximum number of insertion points and with outermost insertion points within the bearing area of footings.
  - 2. Adjust compaction grid arrangement and spacing as directed by Engineer to achieve required densification.
- E. Insert vibrator to maximum specified depth. Densify soils for 30 seconds or other time as directed by Geotechnical Engineer. Withdraw vibrator every 12 inches increments and repeat densification at each increment.
  - 1. When subsurface obstruction prevents vibrator insertion to specified depth, request instructions from Engineer to compensate for obstruction.
- F. Tolerances:
  - 1. Maximum Deviation from Center of Completed Compaction: 8 inches from indicated position.
  - 2. Maximum Deviation from Vertical: 4 degrees during vibrator insertion.

### 15.3 EXCAVATION

- A. Underpin adjacent structures that may be damaged by excavation work.
- B. Excavate subsoil to accommodate construction operations, building foundations, paving and traffic areas, and site structures.
- C. Excavate to working elevation for piling work.
- D. Compact disturbed load-bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 31 23 23 and Section 31 23 17.
- E. Slope banks with machine to angle of repose or less until shored.
- F. Do not interfere with 45 degree bearing splay of foundations.
- G. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- H. Trim excavation. Remove loose matter.
- I. Notify Architect/Engineer of unexpected subsurface conditions.

- J. Correct areas over excavated with structural fill as directed by Architect/Engineer.
- K. Remove excess and unsuitable material from site.
- L. Stockpile subsoil in area designated on site to depth not exceeding 8-feet and protect from erosion.
- M. Repair or replace items indicated to remain damaged by excavation.

#### **15.4 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request visual inspection of bearing surfaces by Architect/Engineer before installing subsequent work.

#### **15.5 PROTECTION**

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

**END OF SECTION**



## SECTION 31 23 17

### TRENCHING

#### PART 16 GENERAL

##### 16.1 SUMMARY

- A. Section Includes:
  - 1. Excavating trenches for utilities from 5-feet outside building to utility service.
  - 2. Compacted fill from top of utility bedding to subgrade elevations.
  - 3. Backfilling and compaction.
  
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  - 2. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  - 3. Section 31 22 13 - Rough Grading: Topsoil and subsoil removal from site surface.
  - 4. Section 31 23 16 - Excavation: General building excavation.
  - 5. Section 31 23 23 - Fill: General backfilling.
  - 6. Section 31 37 00 - Riprap.
  - 7. Section 32 91 19 - Landscape Grading: Filling of topsoil over backfilled trenches to finish grade elevation.
  - 8. Section 33 31 00 - Sanitary Utility Sewerage Piping: Sanitary sewer piping and bedding from building to utility service.
  - 9. Section 33 41 00 - Storm Utility Drainage Piping: Storm sewer piping and bedding from building to utility service.
  - 10. Section 33 46 00 - Subdrainage: Building perimeter drainage, filter aggregate, filter fabric, and granular cover.
  - 11. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

##### 16.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Trenching:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes excavating to required elevations, protecting excavation, stockpiling excavated materials and removing excavated materials from site. Over Excavating: Payment is not made for over excavated work nor for replacement materials.
  
- B. Subsoil Fill:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
  
- C. Structural Fill:

1. Basis of Measurement: By cubic yard.
  2. Basis of Payment: Includes furnishing fill material, stockpiling, shaping substrate surface, placing where required, and compacting.
- D. Granular Fill:
1. Basis of Measurement: By cubic yard.
  2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
- E. Concrete Fill:
1. Basis of Measurement: By cubic yard.
  2. Basis of Payment: Includes furnishing materials, forming, mixing and placing where required, and curing.

### 16.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  6. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

### 16.4 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

### 16.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Product Data: Submit data for geotextile fabric indicating fabric and construction.

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- D. Samples: Submit, in air-tight containers, four, 20-lb samples of each type of fill to Engineer for testing.
- E. Materials Source: Submit name of imported fill materials suppliers.
- F. Manufacturer's Certificate(s): Certify Products meet or exceed specified requirements.

**16.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

**16.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content, where possible.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform all Work in accordance with Local government and NCDOT Standards, as applicable.

**16.8 QUALIFICATIONS**

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of North Carolina.

**16.9 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**16.10 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

### **17.1 FILL MATERIALS**

- A. All types of fill materials referred to on site drawings utilize the nomenclature established by the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. All course aggregate materials to be used shall conform to these standards and to any issued by the Local government, as applicable.

### **17.2 ACCESSORIES**

- 1. Geotextile Fabric: Non-biodegradable, woven.

## **PART 18 EXECUTION**

### **18.1 LINES AND GRADES**

- A. Lay pipes to lines and grades indicated on Drawings.
  - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
  - 2. Use laser-beam instrument with qualified operator to establish lines and grades.

### **18.2 PREPARATION**

- A. Call Local Utility Line Information service at 800-632-4949 not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns and other features remaining as a portion of final landscaping.
- D. Protect benchmarks, survey control points and all existing features designated to remain from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control [and detours] when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

### **18.3 TRENCHING**

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume. Remove larger material as specified in Section 31 23 16.
- C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.

- D. Do not advance open trench more than 200 linear feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- F. Excavate bottom of trenches maximum 2-feet wider than outside diameter of pipe.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.
- H. Do not interfere with bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 2-feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- J. When subsurface materials at bottom of trench are loose or soft, notify Engineer and request instructions.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.
- N. Remove excess subsoil not intended for reuse, from site.

#### **18.4 SHEETING AND SHORING**

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5-feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to Work due to settlement, water or earth pressure, or other causes resulting from inadequate sheeting, shoring, or bracing.

#### **18.5 BACKFILLING**

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

- C. Place geotextile fabric prior to placing subsequent fill materials.
- D. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- E. Employ placement method that does not disturb or damage foundation perimeter drainage, utilities in trench, and other subsurface utilities to remain.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Do not leave more than 50-feet of trench open at end of working day.
- H. Protect open trench to prevent danger to the public.

### **18.6 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling: Plus or minus 0.08 feet from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 0.10 feet from required elevations.

### **18.7 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D1557. ASTM D698. AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556, ASTM D2167 or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, contact Engineer for direction.

### **18.8 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

**END OF SECTION**

## SECTION 31 23 23

### FILL

#### PART 19 GENERAL

##### 19.1 SUMMARY

- A. Section Includes:
  - 1. Backfilling building perimeter to subgrade elevations.
  - 2. Backfilling site structures to subgrade elevations.
  - 3. Fill under slabs-on-grade.
  - 4. Fill under paving.
  - 5. Fill for over-excavation.
  
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  - 2. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  - 3. Section 31 22 13 - Rough Grading: Site filling.
  - 4. Section 31 23 16 - Excavation.
  - 5. Section 31 23 17 - Trenching: Backfilling of utility trenches.
  - 6. Section 31 37 00 - Riprap.
  - 7. Section 32 91 19 - Landscape Grading: Filling of topsoil to finish grade elevation.
  - 8. Section 33 46 00 - Subdrainage: Filter aggregate [and filter fabric].
  - 9. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

##### 19.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fill Material:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes supplying fill materials, stockpiling, [scarifying substrate surface,] placing where required, and compacting.
  
- B. Structural Fill Material:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
  
- C. Concrete Fill:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes supplying fill material, forming, mixing and placing where required, and curing.

##### 19.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
  1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
  3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
  5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  7. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

#### 19.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- C. Samples: Submit, in airtight containers, four, 20-lb samples of each type of proposed fill material to Engineer.
- D. Materials Source: Submit name of imported fill materials suppliers.
- E. Manufacturer's Certificate(s): Certify that fill materials meet or exceed specified requirements.

#### 19.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify source and origin for salvaged and reused products, as applies.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.



- c. Products with recycled material content.
- d. Local and regional products.

## 19.6 QUALITY ASSURANCE

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform all Work in accordance with Local government and NCDOT standards.

## PART 20 PRODUCTS

### 20.1 FILL MATERIALS

- A. All fill material (including Structural and Concrete) to be used during construction shall conform to the standards set forth in NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. Fill materials must, also, conform to any and all standards issued by the Local government, as applicable.

### 20.2 ACCESSORIES

- A. Geotextile Fabric: Non-biodegradable, woven.

## PART 21 EXECUTION

### 21.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.

### 21.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural or granular fill (per Engineer's instruction) and compact to density equal to or greater than requirements for subsequent fill material.
- C. Scarify subgrade surface to depth of 6-inches.

- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

### **21.3 BACKFILLING**

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place geotextile fabric over fill material prior to placing next lift of fill.
- D. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- E. Employ placement method that does not disturb or damage other work.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- H. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- I. Slope grade away from building at minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- J. Make gradual grade changes. Blend slope into level areas.
- K. Remove surplus backfill materials from site.
- L. Leave fill material stockpile areas free of excess fill materials.

### **21.4 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Within Building Areas: Plus or minus 1-inch from required elevations.
- C. Top Surface of Backfilling Under Paved Areas: Plus or minus 1-inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1-inch from required elevations.

### **21.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Perform laboratory material tests in accordance with ASTM D1557. ASTM D698. AASHTO T180.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Proof roll compacted fill surfaces under slabs-on-grade, pavers, and all paving.

## **21.6 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

**END OF SECTION**



## SECTION 31 25 13

### EROSION CONTROLS

#### PART 22 GENERAL

##### 22.1 SUMMARY

- A. Section Includes:
  - 1. Diversion Channels.
  - 2. Rock Energy Dissipator.
  - 3. Rock Basin.
  - 4. Rock Barriers.
  - 5. Sediment Ponds.
  - 6. Sediment Traps.
  
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork.
  - 2. Section 31 05 16 - Aggregates for Earthwork.
  - 3. Section 31 10 00 - Site Clearing.
  - 4. Section 31 23 16 - Excavation.
  - 5. Section 31 23 23 - Fill.
  - 6. Section 31 37 00 - Riprap.
  - 7. Section 32 13 13 - Concrete Paving.
  - 8. Section 32 91 19 - Landscape Grading.
  - 9. Section 32 92 19 - Seeding and Soil Supplements.
  - 10. Section 33 42 13 - Pipe Culverts.

##### 22.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Diversion Channel:
  - 1. Basis of Measurement: By linear foot.
  - 2. Basis of Payment: Includes excavating, windrowing, compacting, seeding, and mulching.
  
- B. Rock Energy Dissipator:
  - 1. Basis of Measurement: By each unit.
  - 2. Basis of Payment: Includes cleaning, excavating, backfilling, placing embankment, placing geotextile fabric, placing rock, and required grouting.
  
- C. Rip Rap Outlet Protection:
  - 1. Basis of Measurement: By tons.
  - 2. Basis of Payment: Includes placing rock, and coarse aggregate filter blanket.
  
- D. Sediment Basin:
  - 1. Basis of Measurement: By each unit.

2. Basis of Payment: Includes excavating, removing unsuitable material, backfilling, placing embankment, clearing, placing rock, and grouting.
- E. Skimmer Sediment Basin:
  1. Basis of Measurement: By each unit.
  2. Basis of Payment: Includes clearing, excavating, piping, placing riser footing, constructing embankment and trench and rock basin, seeding and mulching.
- F. Temporary Sediment Trap:
  1. Basis of Measurement: By each unit.
  2. Basis of Payment: Includes clearing, excavating, forming embankment, placing aggregate or rock and geotextile fabric, seeding, and mulching.
- G. Cleaning Sedimentation Structures:
  1. Basis of Measurement: By cubic yard.
  2. Basis of Payment: Includes removal, hauling and disposal of sediment and other debris in system.

## 22.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  1. AASHTO T88 - Standard Specification for Particle Size Analysis of Soils.
  2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. American Concrete Institute:
  1. ACI 301 - Specifications for Structural Concrete.
- C. ASTM International:
  1. ASTM C127 - Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
  2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- D. Precast/Prestressed Concrete Institute:
  1. PCI MNL-116S - Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

## 22.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Product Data: Submit data on joint filler, joint sealer, admixtures, curing compounds and/or geotextile, as applies.

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- C. Test Reports: Indicate certified tests results for precast concrete at manufacturing facility, cast-in-place concrete in-field and granular backfill, as applies.
- D. Manufacturer's Certificate: Certify Products meet or exceed Local government, NCDENR and NCDOT Standards, latest editions.

**22.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

**22.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

**22.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with requirements of Section 31 05 13, Section 31 05 16, Section 31 10 00, Section 31 23 16, Section 31 23 23, Section 31 37 00, Section 32 13 13, Section 32 91 19, Section 32 92 19, Section 33 42 13, Section 03 10 00, Section 03 20 00, Section 03 30 00, Section 03 41 00, Section 04 05 03, Section 05 12 00, Section 05 50 00, and Section 07 90 00.
- B. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content when possible.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform Work in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**22.8 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

**22.9 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not place grout when air temperature is below freezing.
- C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

**PART 23 PRODUCTS****23.1 ROCK AND GEOTEXTILE MATERIALS**

- A. Furnish materials in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- B. Rock: As specified in Section 31 37 00.
- C. Geotextile Fabric: As specified in Section 31 37 00.

**23.2 CONCRETE MATERIALS AND REINFORCEMENT**

- A. Cement: Type III, grey, as specified in Section 03 30 00.
- B. Fine and Coarse Aggregates: as specified in Section 03 30 00.
- C. Water: Clean and not detrimental to concrete.
- D. Aggregate, Sand, Water, Admixtures - Precast: Determined by precast fabricator, as appropriate to design requirements.
- E. Reinforcement Steel: As specified in Section 03 20 00. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- F. Welded Steel Wire Fabric: Galvanized, as specified in Section 03 20 00. Furnish in accordance with Local government and NCDOT standards, latest editions.

**23.3 BLOCK, STONE, AGGREGATE, AND SOIL MATERIALS**

- A. Precast Solid Concrete Block: Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- B. Stone: As specified in Section 04 42 13. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- C. Coarse Aggregate: As specified in Section 31 05 16. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.



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- D. Soil Backfill: As specified in Section 31 05 13. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**23.4 PLANTING MATERIALS**

- A. Seeding and Soil Supplements: As specified in Section 32 92 19 and on plan sheets. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- B. Mulch: As specified in Section 32 92 19 and on plan sheets. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**23.5 PIPE MATERIALS**

- A. Pipe: Concrete, as specified in Section 33 42 13, and/or HDPE per plans. Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**23.6 ACCESSORIES**

- A. Joint Sealers: As specified in Section 07 90 00. Furnish in accordance with Local government and NCDOT Standards, latest editions.
- B. Joint Filler: As specified in Section 07 90 00. Furnish in accordance with Local government and NCDOT Standards, latest editions.
- C. Building Paper: Furnish in accordance with Local government and NCDOT Standards, latest editions.
- D. Grout: As specified in Section 04 05 03. Furnish in accordance with Local government and NCDOT Standards, latest editions.
- E. Steel Plate Anti-Vortex Device: Furnish in accordance with Local government and NCDOT Standards, latest editions.
- F. Welding Material: Furnish in accordance with Local government and NCDOT Standards, latest editions.
- G. Anti-Seep Collar: Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.
- H. Trash Rack: Furnish in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**23.7 MIXES**

- A. Concrete: 3,000 – 4,000 psi, as specified in Section 03 30 00. Furnish in accordance with Local government and NCDOT Standards, latest editions.

**23.8 SOURCE QUALITY CONTROL (AND TESTS)**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Provide composition reports and test results on cement, aggregates, and mixes to ensure conformance with specified requirements.
- C. Make all material reports and test results available to Engineer at least twenty-one calendar days before the approval of Engineer is required.
- D. All composition reports and test results must be certified authentic and valid by the material manufacturer and/or a third party qualified to provide and certify such analyses.

**PART 24 EXECUTION**

**24.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted stabilized soil is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations of base or foundation for other work are correct.

**24.2 DIVERSION CHANNELS**

- A. Windrow excavated material on low side of channel.
- B. Compact to 95 percent maximum density.
- C. On entire channel area, apply soil supplements and sow seed as specified in Section 32 92 19.
- D. Mulch seeded areas with hay as specified in Section 32 92 19.

**24.3 ROCK ENERGY DISSIPATOR**

- A. Excavate to indicated depth of rock lining or nominal placement thickness as follows. Remove loose, unsuitable material below bottom of rock lining, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.

NCSA Class	Nominal Placement Thickness inches
R8	48
R7	36
R6	30
R5	24

R4	18
R3	12

- B. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope. Provide a minimum overlap of 3 feet. Offset adjacent roll ends a minimum of 5 feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than 14 calendar days.
- C. Carefully place rock on geotextile fabric to produce an even distribution of pieces, with minimum of voids and without tearing geotextile.
- D. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and to avoid displacement of underlying material. Arrange individual rocks for uniform distribution.
  - 1. Saturate rock with water. Fill voids between pieces with grout, for at least top 6 inches. Sweep surface with stiff broom to remove excess grout.
  - 2. Moist cure grouted rock for at least 3 days after grouting, using water saturated burlap in accordance with Section 03 30 00.

#### 24.4 PAVED ENERGY DISSIPATOR

- A. Excavate to required paving depth. Remove loose, unsuitable material below bottom of paving, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
- B. Place forms and reinforcement in accordance with Section 32 13 13. Hold reinforcement firmly in position during placing of concrete.
- C. Mix, place, finish, and cure concrete, as specified in Section 32 13 13.
- D. Embed stones or blocks 3 inches in plastic concrete at indicated separation on slopes and channel bottom.
- E. Pave in uniform 10 foot lengths or sections.
- F. Pave in shorter sections as necessary for closures or curves.
- G. Place premolded expansion joint filler, 1/2 inch thick, cut to conform to paving cross sections, at ends of curved sections at intervals of not more than 100 feet, at end of day's work, and where paving is adjacent to rigid structure. Use joint filler with depth of 1/2 inch less than paving depth and press firmly against adjacent concrete.
- H. Form intermediate joints between sections, with two thicknesses of bituminous paper cut neatly to paving cross section.
- I. Seal joint top with joint sealer.

**24.5 ROCK DAM SEDIMENT BASIN**

- A. Construct generally in accordance with rock energy dissipator requirements to indicated shape and depth. Rock courses may be placed in several operations but minimum depth of initial course must be 3 feet or greater.

**24.6 ROCK BARRIER**

- A. Determine length required for ditch or depression slope and excavate, compact and foundation area to firm, even surface.
- B. Produce an even distribution of rock pieces, with minimum voids to the indicated shape, height and slope.
- C. Install in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

**24.7 SEDIMENTATION PONDS**

- A. This sub-part includes construction of the following:
  - 1. Sediment Basins
  - 2. Skimmer Sediment Basins
- B. Clear and grub storage area and embankment foundation area site as specified in Section 31 10 00.
- C. Excavate key trench for full length of dam. Excavate emergency spillway in natural ground.
- D. Install pipe spillway, with anti-seep collar attached, at location indicated.
- E. Place forms, and reinforcing for concrete footing at bottom of riser pipe with trash rack, anti-vortex device and skimmer device, per plan sheets, and as specified in Section 03 10 00 and Section 03 20 00. Construction of embankment and trench prior to placing pipe is not required.
- F. Mix, place, finish, and cure concrete, as specified in Section 03 30 00.
- G. Do not use coarse aggregate as backfill material around pipe. Backfill pipe with suitable embankment material to prevent dam leakage along pipe.
- H. Construct rock basin at outlet end of pipe, as specified in this Section. Place embankment material, as specified in Section 31 23 23. When required, obtain borrow excavation for formation of embankment, as specified in Section 31 23 23.
- I. On entire sedimentation pond area, apply soil supplements and sow seed as specified in Section 32 92 19.
- J. Mulch seeded areas with hay as specified in Section 32 92 19.

- K. Install in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

#### 24.8 SEDIMENT TRAPS

- A. This sub-part includes construction of the following:
  - 1. Temporary Sediment Traps
- B. Clear site, as specified in Section 31 10 00.
- C. Construct trap by excavating and forming embankments as specified in Section 31 23 16, and Section 31 23 23.
- D. Place coarse aggregate or rock at outlet as indicated on Drawings.
- E. Place geotextile fabric, as specified for rock energy dissipator.
- F. When required, obtain borrow excavation for formation of embankment, as specified in Section 31 23 16.
- G. On entire sediment trap area, apply soil supplements and sow seed as specified in Section 32 92 19.
- H. Mulch seeded areas with hay as specified in Section 32 92 19.
- I. Install in accordance with Local government, NCDENR and NCDOT Standards, latest editions.

#### 24.9 SITE STABILIZATION

- A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.
- C. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 3:1 or flatter.
- D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
  - 1. During non-germinating periods, apply mulch at recommended rates.
  - 2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 92 19.
  - 3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 92 19 permanent seeding specifications.
- E. Stabilize diversion channels, sediment basins & traps, and stockpiles immediately.

**24.10 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.
- C. Field test concrete in accordance with Section 03 30 00.
- D. Compaction Testing: As specified in Section 31 23 23.
- E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- F. Frequency of Compaction Testing: One for each lift.

**24.11 CLEANING**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. When sediment accumulation in sedimentation structures has reached a point one-half depth of sediment structure or device, remove and dispose of sediment.
- C. Do not damage structure or device during cleaning operations.
- D. Do not permit sediment to erode into construction or site areas or natural waterways.
- E. Clean channels when depth of sediment reaches approximately one half channel depth.

**24.12 PROTECTION**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- C. Do not permit construction traffic over asphalt paving for 7 days minimum after finishing. Do not permit construction traffic over concrete paving until 75 percent design strength of concrete has been achieved.
- D. Protect paving from elements, flowing water, or other disturbance until curing is completed.

**24.13 SCHEDULES**

- A. Erosion Control Schedule: Please refer to plan sheets to for sequencing of installing erosion control measures.

**END OF SECTION**

**SECTION 31 31 16  
TERMITE CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Chemical soil treatment.

**1.02 REFERENCE STANDARDS**

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act 2019.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Test Reports: Indicate regulatory agency approval reports when required.
- D. Manufacturer's Instructions: Indicate caution requirement.
- E. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing this type of work and:
  - 1. Having minimum of three (3) years documented experience.
  - 2. Approved by manufacturer of treatment materials.
  - 3. Licensed in the State in which the Project is located.

**1.05 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year installer's warranty against damage to building caused by termites.
  - 1. Include coverage for repairs to building and to contents damaged due to building damage. Repair damage and, if required, re-treat.

**PART 2 PRODUCTS**

**2.01 CHEMICAL SOIL TREATMENT**

- A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.
- B. Manufacturers:
  - 1. Bayer Environmental Science Corp: [www.backedbybayer.com/pest-management/#sle](http://www.backedbybayer.com/pest-management/#sle). Bayer Environmental Science Corp: [www.backedbybayer.com/pest-management/#sle](http://www.backedbybayer.com/pest-management/#sle). Bayer Environmental Science Corp: [www.backedbybayer.com/pest-management/#sle](http://www.backedbybayer.com/pest-management/#sle).
  - 2. FMC Professional Solutions: [www.fmcprosolutions.com/#sle](http://www.fmcprosolutions.com/#sle).
  - 3. Syngenta Professional Products: [www.syngentaprofessionalproducts.com/#sle](http://www.syngentaprofessionalproducts.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

**3.02 APPLICATION - CHEMICAL TREATMENT**

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:

1. Under Slabs-on-Grade.
2. At Both Sides of Foundation Surface.

- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.
- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

### **3.03 PROTECTION**

- A. Do not permit soil grading over treated work.

**END OF SECTION**



## **SECTION 31 37 00**

### **RIPRAP**

#### **PART 25 GENERAL**

##### **25.1 SUMMARY**

- A. Section Includes:
  - 1. Riprap placed loose.
  - 2. Riprap placed in bags.
- B. Related Sections:
  - 1. Section 31 05 16 - Aggregates for Earthwork.
  - 2. Section 31 22 13 - Rough Grading.
  - 3. Section 31 23 16 - Excavation: Excavating for riprap.
  - 4. Section 31 23 17 - Trenching
  - 5. Section 31 23 23 - Fill.
  - 6. Section 32 91 19 - Landscape Grading: Topsoil placement.
  - 7. Section 33 42 13 - Pipe Culverts.

##### **25.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Riprap:
  - 1. Basis of Measurement: By ton.
  - 2. Basis of Payment: Includes supply and placing riprap mix in sacks, moist cured.

##### **25.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for riprap bags, binder and geotextile fabric.
- C. Samples: Submit, in airtight containers, four, 20-lb sample of riprap materials to Engineer for testing.
- D. Manufacturer's Certificate: Certify that riprap products meet or exceed specified requirements.

##### **25.4 QUALITY ASSURANCE**

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform all Work in accordance with Local government and NCDOT Standards.

**26.1 MATERIALS**

- A. Perform all Work in accordance with Local government and NCDOT standards.
- B. Riprap: Granite type; broken stone; solid and nonfriable; 3-inch minimum size, 6-inch maximum size.
- C. Geotextile Fabric: Non-biodegradable, woven.

**PART 27 EXECUTION**

**27.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

**27.2 PLACEMENT**

- A. Place geotextile fabric over substrate, lap edges and ends.
- B. Place riprap at culvert pipe ends, at embankment slopes and as indicated on Drawings.
- C. Installed Thickness: As indicated on Drawings.
- D. Place rock evenly and carefully over geotextile to minimize voids; do not tear fabric. Place rock in one consistent operation to preclude disturbance or displacement of substrate.

**END OF SECTION**

## SECTION 32 11 23

### AGGREGATE BASE COURSES

#### PART 28 GENERAL

##### 28.1 SUMMARY

- A. Section Includes:
  - 1. Aggregate subbase.
  - 2. Aggregate base course.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading: Preparation of site for base course.
  - 2. Section 31 23 17 - Trenching: Compacted fill under base course.
  - 3. Section 31 23 23 - Fill: Compacted fill under base course.
  - 4. Section 31 37 00 - Riprap.
  - 5. Section 32 12 16 - Asphalt Paving: Binder and finish asphalt courses.
  - 6. Section 32 13 13 - Concrete Paving: Finish concrete surface course.
  - 7. Section 32 91 19 - Landscape Grading: Topsoil fill at areas adjacent to aggregate base course.
  - 8. Section 33 05 13 - Manholes and Structures.

##### 28.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Aggregate Subbase:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
  
- B. Aggregate Base Course:
  - 1. Basis of Measurement: By the cubic yard.
  - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

##### 28.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
  - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).

2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D2940 - Standard Specification for Graded Aggregate Material For Bases or Subbases for Highways or Airports.
7. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

#### 28.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  1. Submit data for geotextile fabric and herbicide.
- C. Samples: Submit, in airtight containers, four, 20-lb samples of each type of aggregate fill to testing laboratory.
- D. Materials Source: Submit name of aggregate materials suppliers.
- E. Manufacturer's Certificate: Certify that aggregate products meet or exceed specified requirements.

#### 28.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
- C. Materials Resources Certificates:
  - a. Certify recycled material content for recycled content products.
  - b. Certify source for local and regional materials and distance from Project site.
- D. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

- A. Furnish each aggregate material from single source throughout the Work.
- B. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform Work in accordance with Local government and NCDOT Standards, as applicable.

**PART 29 PRODUCTS**

**29.1 AGGREGATE MATERIALS**

- A. Subbase Aggregate: ASTM D2940; graded type.

Sieve Size	Percent Passing
2 inches	100
No. 4	30 to 60
No. 200	0 to 12

- B. Base Aggregate: ASTM D2940; graded type.

Sieve Size	Percent Passing
2 inches	100
1-1/2 inches	95 to 100
3/4 inches	70 to 92
3/8 inches	50 to 70
No. 4	35 to 55
No. 30	12 to 25
No. 200	0 to 8

**29.2 ACCESSORIES**

- A. Geotextile Fabric: AASHTO M288; non-woven, polypropylene.
- B. Herbicide: At Engineer’s direction only.

### **30.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
  - 1. Proof roll substrate in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 23 23.
- C. Verify substrate has been inspected, gradients and elevations are correct.

### **30.2 PREPARATION**

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

### **30.3 AGGREGATE PLACEMENT**

- A. Install geotextile fabric over subgrade in accordance with manufacturer's instructions.
  - 1. Lap ends and edges minimum 6 inches.
  - 2. Anchor fabric to subgrade when required to prevent displacement until aggregate is installed.
- B. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
- C. Place aggregate equal thickness layers to total compacted thickness indicated on Drawings.
  - 1. Maximum Layer Compacted Thickness: 8-inches.
  - 2. Minimum Layer Compacted Thickness: 4-inches.
- D. Roller compact aggregate to 95 percent maximum density.
- E. Level and contour surfaces to elevations, profiles, and gradients indicated.
- F. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- G. Maintain optimum moisture content of fill materials to attain specified compaction density.
- H. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

### **30.4 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Maximum Variation From Flat Surface: ½-inch measured with 10 foot straight edge.
- C. Maximum Variation From Thickness: ¼-inch.
- D. Maximum Variation From Elevation: ½-inch.

### **30.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Compaction testing will be performed in accordance with AASHTO T180.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
  - 1. Frequency of Tests: One test for every 1000 square yards of each layer compacted aggregate.

**END OF SECTION**





**SECTION 32 12 16**  
**ASPHALT PAVING**

**PART 31 GENERAL**

**31.1 SUMMARY**

- A. Section Includes:
1. Asphalt materials.
  2. Aggregate materials.
  3. Aggregate subbase.
  4. Asphalt paving base course, binder course, and wearing course.
  5. Asphalt paving overlay for existing paving.
  6. Surface slurry.
- B. Related Sections:
1. Section 09 90 00 - Painting and Coating: Pavement markings.
  2. Section 31 22 13 - Rough Grading: Preparation of site for paving [and base].
  3. Section 31 23 23 - Fill: Compacted subbase for paving.
  4. Section 32 11 23 - Aggregate Base Courses: Compacted subbase for paving.
  5. Section 32 17 13 - Parking Bumpers: [Concrete] [Timber] [ ] bumpers.
  6. Section 32 17 23 - Pavement Markings: Painted pavement markings, lines, and legends.
  7. Section 33 05 13 - Manholes and Structures.

**31.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Aggregate Subbase:
1. Basis of Measurement: By ton.
  2. Basis of Payment: Includes supplying and stockpiling aggregate, scarifying substrate surface, placing, and compacting subbase.
- B. Asphalt Paving Base Course:
1. Basis of Measurement: By ton.
  2. Basis of Payment: Includes priming surfaces, tack coating surfaces, furnishing, placing, compacting, and testing base course.
- C. Asphalt Paving Binder Course:
1. Basis of Measurement: By ton.
  2. Basis of Payment: Includes priming surfaces, tack-coating surfaces, furnishing, placing, compacting, and testing binder course.
- D. Asphalt Paving Wearing Course:
1. Basis of Measurement: By ton.
  2. Basis of Payment: Includes priming surfaces, tack-coating surfaces, furnishing, placing, compacting, and testing wearing course.

## Division 32 – Exterior Improvements

- E. Tack Coat:
  - 1. Basis of Measurement: By square yard.
  - 2. Basis of Payment: Includes preparing surfaces and applying.

**31.3 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M17 - Standard Specification for Mineral Filler for Bituminous Paving Mixtures.
  - 2. AASHTO M29 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
  - 3. AASHTO M140 - Standard Specification for Emulsified Asphalt.
  - 4. AASHTO M208 - Standard Specification for Cationic Emulsified Asphalt.
  - 5. AASHTO M288 - Standard Specification for Geotextile Specification for Highway Applications.
  - 6. AASHTO M320 - Standard Specification for Performance-Graded Asphalt Binder.
  - 7. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
  - 8. AASHTO MP1a - Standard Specification for Performance-Graded Asphalt Binder.
- B. Asphalt Institute:
  - 1. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
  - 2. AI MS-19 - Basic Asphalt Emulsion Manual.
  - 3. AI SP-2 - Superpave Mix Design.
- C. ASTM International:
  - 1. ASTM D242 - Standard Specification for Mineral Filler For Bituminous Paving Mixtures.
  - 2. ASTM D692 - Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures.
  - 3. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction.
  - 4. ASTM D977 - Standard Specification for Emulsified Asphalt.
  - 5. ASTM D1073 - Standard Specification for Fine Aggregate for Bituminous Paving Mixtures.
  - 6. ASTM D1188 - Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens.
  - 7. ASTM D2027 - Standard Specification for Cutback Asphalt (Medium-Curing Type).
  - 8. ASTM D2397 - Standard Specification for Cationic Emulsified Asphalt.
  - 9. ASTM D2726 - Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
  - 10. ASTM D2950 - Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
  - 11. ASTM D3381 - Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
  - 12. ASTM D3515 - Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

13. ASTM D3549 - Standard Test Method for Thickness or Height of Compacted Bituminous Paving Mixture Specimens.
14. ASTM D3910 - Standard Practices for Design, Testing, and Construction of Slurry Seal.
15. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

### **31.4 PERFORMANCE REQUIREMENTS**

- A. Paving: Superpave design based on 0.3 – 3.0 million equivalent single axle loads (ESAL) for 20 year paving design life.

### **31.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  1. Submit product information for asphalt and aggregate materials.
  2. Submit mix design with laboratory test results supporting design.
- C. Manufacturer's Certificate: Certify Asphalt Paving Products meet or exceed specified requirements.

### **31.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Sustainable Sites Certificates:
    - a. Certify paving materials solar reflectance index.
  2. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Products with recycled material content.
    - b. Local and regional products.

### **31.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with all Local government and NCDOT Standards.
- B. Mixing Plant: Conform to all Local government and NCDOT Standards.
- C. Obtain materials from same source throughout.

## Division 32 – Exterior Improvements

- D. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content, where available.
- E. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

**31.8 QUALIFICATIONS**

- A. Installer: Company specializing in performing work of this section with minimum 5 years documented experience.

**PART 32 PRODUCTS****32.1 ASPHALT MATERIALS**

- A. All asphalt pavements referred to on site drawings utilize the nomenclature established by the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. All asphalt pavement components to be used shall conform to these standards and to any issued by the Local government, as applicable.

**32.2 AGGREGATE MATERIALS**

- A. All gradations of aggregate materials associated with asphalt pavements specified on site drawings shall conform to the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. All aggregate materials shall conform to all standards issued by the Local government, as applicable.

**32.3 ACCESSORIES**

- A. Geotextile Fabric: AASHTO M288; non-woven, polypropylene.

**32.4 MIXES**

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Asphalt Paving Mixtures: Designed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

**32.5 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Submit proposed mix design of each class of mix for review prior to beginning of Work.

### **33.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify utilities indicated under paving are installed with excavations and trenches backfilled and compacted.
- C. Verify compacted subgrade subbase is dry and ready to support paving and imposed loads.
  - 1. Proof roll subbase with minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 23 23.
- D. Verify gradients and elevations of base are correct.
- E. Verify gutter drainage grilles & frames and manhole frames are installed in correct position and elevation.

### **33.2 SUBBASE**

- A. Aggregate Subbase: Install as specified in Section 32 11 23.

### **33.3 EXISTING WORK**

- A. Saw cut and notch existing paving [as indicted on Drawings].
- B. Clean existing paving to remove foreign material, excess joint sealant and crack filler from paving surface.
- C. Repair surface defects in existing paving to provide uniform surface to receive new paving.

### **33.4 PRIMER**

- A. Apply primer in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions. Apply primer on [aggregate] [ ] subbase at uniform rate of [1/3] [1/2] [ ] gal/sq yd.
- B. Use clean sand to blot excess primer.

### **33.5 TACK COAT**

- A. Apply tack coat in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

**33.6 SINGLE COURSE ASPHALT PAVING**

- A. Install Work in accordance with with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.
- B. Place asphalt wearing course to thickness indicated on Drawings.
- C. Compact paving by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- D. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.

**33.7 DOUBLE COURSE ASPHALT PAVING**

- A. Place asphalt binder course within 24 hours of applying primer or tack coat.
- B. Place binder course to thickness indicated on Drawings.
- C. Place wearing course within 24 hours of placing and compacting binder course. When binder course is placed more than 24 hours before placing wearing course, clean surface and apply tack coat before placing wearing course.
- D. Place wearing course to thickness indicated on Drawings.
- E. Compact each course by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- F. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

**33.8 ASPHALT PAVING OVERLAY**

- A. Apply [asphalt cement] [tack coat] to existing paving surface at rate recommended by geotextile fabric manufacturer.
- B. Install geotextile fabric in accordance with manufacturer's instructions to permit asphalt saturation of fabric. Lap fabric edge and end joints 4 inches.
- C. Place wearing course to thickness indicated on Drawings.
- D. Compact overlay by rolling to specified density. Do not displace or extrude paving from position. Hand compact in areas inaccessible to rolling equipment.
- E. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

**33.9 SURFACE SLURRY**

- A. Install uniform thickness surface slurry over existing paving in accordance with ASTM D3910.

B. Allow slurry to cure.

C. Roll paving to achieve uniform surface.

### 33.10 ERECTION TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Flatness: Maximum variation of ¼-inch measured with 10 foot straight edge.

C. Scheduled Compacted Thickness: Within ¼-inch.

D. Variation from Indicated Elevation: Within ½-inch.

### 33.11 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Take samples and perform tests including mat density tests in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

C. Asphalt Paving Mix Temperature: Measure temperature at time of placement.

D. Asphalt Paving Thickness: ASTM D3549; test one core sample from every 1000 square yards compacted paving.

E. Asphalt Paving Density: ASTM D1188 or ASTM D2726; test one core sample from every 1000 square yards compacted paving.

### 33.12 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

**END OF SECTION**





**SECTION 32 13 13**  
**CONCRETE PAVING**

**PART 34 GENERAL**

**34.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete paving for:
    - a. Concrete sidewalks.
    - b. Concrete stair steps.
    - c. Concrete integral curbs and gutters.
    - d. Concrete median barriers.
    - e. Concrete parking areas and roads.
- B. Related Sections:
  - 1. Section 07 90 00 - Joint Protection: Sealant for joints.
  - 2. Section 09 90 00 - Painting and Coating: Pavement markings.
  - 3. Section 31 22 13 - Rough Grading: Preparation of site for paving.
  - 4. Section 31 23 23 - Fill: Compacted subbase for paving.
  - 5. Section 32 11 23 - Aggregate Base Courses: Base course.
  - 6. Section 32 12 16 - Asphalt Paving: Asphalt wearing course & curbs.
  - 7. Section 32 17 13 - Parking Bumpers: Pre-cast concrete parking bumpers.
  - 8. Section 32 91 19 - Landscape Grading: Preparation of subsoil at pavement perimeter.
  - 9. Section 33 05 13 - Manholes and Structures.

**34.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Aggregate:
  - 1. Basis of Measurement: By ton.
  - 2. Basis of Payment: Includes supplying fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.
- B. Concrete Paving:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes forms, reinforcing, concrete, accessories, placing, finishing, curing, and testing.

**34.3 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
- B. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.

2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ASTM International:
1. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
  2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  3. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
  4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
  5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  6. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
  7. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
  8. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  9. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
  10. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
  11. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  12. ASTM C33 - Standard Specification for Concrete Aggregates.
  13. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  14. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
  15. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
  16. ASTM C150 - Standard Specification for Portland Cement.
  17. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
  18. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
  19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
  20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
  22. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
  23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
  24. ASTM C979 - Standard Specification for Pigments for Integrally Colored Concrete.
  25. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
  26. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

27. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
28. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
29. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
30. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
31. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
32. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

#### **34.4 PERFORMANCE REQUIREMENTS**

- A. Paving: Designed for parking, light duty commercial vehicles, and movement of trucks up to 30,000 lbs. maximum.

#### **34.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  1. Submit data on concrete materials.
- C. Design Data:
  1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
    - a. Hot and cold weather concrete work.
  2. Identify mix ingredients and proportions, including admixtures.
- D. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

#### **34.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Sustainable Sites Certificates:
    - a. Certify paving materials solar reflectance index.
  2. Materials Resources Certificates:
    - a. Certify recycled material content for recycled content products.
    - b. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:
  - a. Products with recycled material content.
  - b. Local and regional products.

### **34.7 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301.
- B. Sustainable Design Requirements:
  1. Recycled Content Materials: Furnish materials with recycled content.
  2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.
- D. Obtain cementitious materials from same source throughout.

### **34.8 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

### **34.9 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

### **34.10 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

## **PART 35 PRODUCTS**

### **35.1 FORM MATERIALS**

- A. Form Materials: Conform to ACI 301.
- B. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, ¼-inch thick.

### **35.2 REINFORCING**

- A. Reinforcing Steel and Wire Fabric: As specified on site drawings.

**35.3 CONCRETE MATERIALS**

- A. Concrete Materials: As specified in the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions
- B. Cement: ASTM C150, Portland type; as specified on site drawings.
- C. Fine and Coarse Aggregates: ASTM C33.
- D. Concrete Reinforcing Fibers: ASTM C1116, high strength industrial-grade fibers specifically engineered for secondary reinforcement of concrete.
- E. Water: ASTM C94/C94M; potable, without deleterious amounts of chloride ions.
- F. Air Entrainment: ASTM C260.

**35.4 CONCRETE MIX - BY PERFORMANCE CRITERIA**

- A. Mix and deliver concrete in accordance with ASTM C94/C94M.
- B. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94/C94M.
- C. Select proportions for normal weight concrete in accordance with ACI 301.
- D. Use accelerating admixtures in cold weather only when approved by the Architect/Engineer in writing. Use of admixtures will not relax cold weather placement requirements.
- E. Use calcium chloride only when approved by the Architect/Engineer in writing.
- F. Use set retarding admixtures during hot weather only when approved by the Architect/Engineer in writing.

**35.5 FABRICATION**

- A. Fabricate reinforcing in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

**35.6 SOURCE QUALITY CONTROL AND TESTS**

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services.
- B. Submit proposed mix design of each class of concrete to Engineer for review prior to commencement of Work.
- C. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.
- D. Test samples in accordance with ASTM C94/C94M and ACI 301.

### **36.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted subbase is dry and ready to support paving and imposed loads.
  - 1. Proof roll subbase with minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 23 23.
- C. Verify gradients and elevations of base are correct.

### **36.2 PREPARATION**

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manholes, catch basins and frames with oil to prevent bond with concrete paving.
- C. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

### **36.3 FORMING**

- A. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

### **36.4 REINFORCING**

- A. Place reinforcing at top and bottom of paving.
- B. Interrupt reinforcing at contraction and expansion joints.

### **36.5 PLACING CONCRETE**

- A. Place concrete in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.
- B. Ensure reinforcing, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- C. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

### **36.6 JOINTS**

- A. Place expansion and contraction joints at 20-foot intervals. Align curb, gutter, and sidewalk joints.
- B. Place joint filler between paving components and building or other appurtenances. Recess top of filler ¼-inch for sealant installation.
- C. Provide scored joints at 5-foot intervals between sidewalks and curbs.
- D. Provide keyed joints as indicated.
- E. Saw cut contraction joints 3/16-inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

### **36.7 FINISHING**

- A. Finish concrete surfaces as directed in General Notes on Site Drawings.

### **36.8 CURING AND PROTECTION**

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete floor surfaces as specified in Section 03 39 00.

### **36.9 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness: ¼-inch in 10-feet.
- C. Maximum Variation From True Position: ¼-inch.

### **36.10 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect reinforcing placement for size, spacing, location and support.
- C. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
- D. Strength Test Samples:
  - 1. Sampling Procedures: A STM C172.
  - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.

3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area paving.
  4. Make one additional cylinder during cold weather concreting, and field cure.
- E. Field Testing:
1. Slump Test Method: ASTM C143/C143M.
  2. Air Content Test Method: ASTM C173/C173M.
  3. Temperature Test Method: ASTM C1064/C1064M.
  4. Measure slump and temperature for each compressive strength concrete sample.
  5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- F. Cylinder Compressive Strength Testing:
1. Test Method: ASTM C39.
  2. Dispose remaining cylinders when testing is not required.
- G. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### **36.11 PROTECTION**

- A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over paving for [7] [\_\_\_\_\_] days minimum after finishing.

**END OF SECTION**



## SECTION 32 17 23

### PAVEMENT MARKINGS

#### PART 37 GENERAL

##### 37.1 SUMMARY

- A. Section Includes:
  - 1. Traffic lines and markings.
  - 2. Legends.
  - 3. Paint.
  - 4. Glass beads.
- B. Related Sections:
  - 1. Section 32 12 16 - Asphalt Paving.
  - 2. Section 32 13 13 - Concrete Paving.

##### 37.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Traffic Lines and Markings:
  - 1. Basis of Measurement: By linear foot.
  - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings for minimum of 3 years, and related maintenance and protection of traffic.
- B. Legends:
  - 1. Basis of Measurement: By each legend.
  - 2. Basis of Payment: Includes furnishing, installing, inspecting and maintaining pavement markings for minimum of 3 years, and related maintenance and protection of traffic.

##### 37.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M247 - Standard Specification for Glass Beads Used in Traffic Paint.
- B. ASTM International:
  - 1. ASTM D34 - Standard Guide for Chemical Analysis of White Pigments.
  - 2. ASTM D126 - Standard Test Methods for Analysis of Yellow, Orange, and Green Pigments Containing Lead Chromate and Chromium Oxide Green.
  - 3. ASTM D562 - Standard Test Method for Consistency of Paints Using the Stormer Viscometer.
  - 4. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
  - 5. ASTM D713 - Standard Practice for Conducting Road Service Tests on Fluid Traffic Marking Materials.

6. ASTM D969 - Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
7. ASTM D1301 - Standard Test Methods for Chemical Analysis of White Lead Pigments.
8. ASTM D1394 - Standard Test Methods for Chemical Analysis of White Titanium Pigments.
9. ASTM D1475 - Standard test Method for Density of Liquid Coatings, Inks, and Related Products.
10. ASTM D1640 - Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature.
11. ASTM D2202 - Standard Test Method for Slump of Sealants.
12. ASTM D2371 - Standard Test Method for Pigment Content of Solvent-Reducible Paints.
13. ASTM D2621 - Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints.
14. ASTM D2743 - Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography.

#### **37.4 PERFORMANCE REQUIREMENTS**

- A. Paint Adhesion: Adhere to road surface forming smooth continuous film one minute after application.
- B. Paint Drying: Tack free by touch so as not to require coning or other traffic control devices to prevent transfer by vehicle tires within two minutes after application.

#### **37.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit paint formulation for each type of paint.
- C. Test Reports: Submit source and acceptance test results in accordance with AASHTO M247.
- D. Manufacturer's Installation Instructions: Submit instructions for application temperatures, eradication requirements, application rate, line thickness, type of glass beads, bead embedment and bead application rate, and any other data on proper installation.
- E. Manufacturer's Certificate: Certify Products meet or exceed NCDOT requirements.

#### **37.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:

- a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Local and regional products.

### **37.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

### **37.8 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing work of this section with minimum three years documented experience.

### **37.9 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Invert containers several days prior to use when paint has been stored more than 2 months. Minimize exposure to air when transferring paint. Seal drums and tanks when not in use.
- C. Glass Beads. Store glass beads in cool, dry place. Protect from contamination by foreign substances.

### **37.10 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.

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- D. Do not apply paint when temperatures are expected to fall below 60 degrees F for 24 hours after application.
- E. Volatile Organic Content (VOC). Do not exceed State or Environmental Protection Agency maximum VOC on traffic paint.

**37.11 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish three year manufacturer's warranty for traffic paints.

**37.12 MAINTENANCE SERVICE**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Furnish service and maintenance of traffic paints for three years from Date of Substantial Completion.

**PART 38 PRODUCTS****38.1 PAINTED PAVEMENT MARKINGS**

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.
  - 1. Paint: Ready mixed, conventional and fast dry waterborne traffic paints, lead-free, non-toxic, NASSHTO Test Deck, minimum retroreflectance of 100 mc/ds, durability rating of 6 or more after in place for 9 months.
  - 2. Glass Beads: AASHTO M247, Type 1, coated to enhance embedment and adherence with paint.

**38.2 EQUIPMENT**

- A. Continuous Longitudinal Line Application Machine: Use application equipment with following capabilities.
  - 1. Dual nozzle paint gun to simultaneously apply parallel lines of indicated width in solid or broken patterns or various combinations of those patterns.
  - 2. Pressurized bead-gun to automatically dispense glass beads onto painted surface, at required application rate.
  - 3. Measuring device to automatically and continuously measure length of each line placed, to nearest foot.
  - 4. Device to heat paint to 130 degrees F for fast dry applications.
- B. Machine Calibration:
  - 1. Paint Line Measuring Device: Calibrate automatic line length gauges to maintain tolerance of plus or minus 25 feet per mile.

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2. Cycle Length/Paint Line Length Timer: Calibrate cycle length to maintain tolerance of plus or minus 6 inches per 40 feet; calibrate paint line length to maintain tolerance to plus or minus 3 inches per 10 feet.
  3. Paint Guns: Calibrate to simultaneously apply paint binder at uniform rates as specified with an allowable tolerance of plus or minus 1 mil.
  4. Bead Guns: Calibrate to dispense glass beads simultaneously at specified rate. Check guns by dispensing glass beads into gallon container for predetermined fixed period of time. Verify weight of glass beads.
- C. Other Equipment:
1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind strippers, hand spray or stencil trucks, apply with equipment meeting requirements of this section. Do not use hand brushes or rollers. Optionally apply glass beads by hand.

**38.3 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Test and analyze traffic paints in accordance with ASTM Standards, as applicable.

**PART 39 EXECUTION****39.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Do not apply paint to concrete surfaces until concrete has cured for 28 days.

**39.2 PREPARATION**

- A. Maintenance and Protection of Traffic:
  1. Provide short term traffic control in accordance with Section 01 50 00 - Temporary Facilities and Controls.
  2. Prevent interference with marking operations and to prevent traffic on newly applied markings before markings dry.
  3. Maintain travel lanes between 7: 00 AM to 9: 00 AM, and between 4: 00 PM and 6: 00 PM.
  4. Maintain access to existing properties requiring access.
- B. Surface Preparation.
  1. Clean and dry paved surface prior to painting.
  2. Blow or sweep surface free of dirt, debris, oil, grease or gasoline.
  3. Spot location of final pavement markings as specified and as indicated on Drawings by applying pavement spots 25 feet on center.
  4. Notify Architect/Engineer after placing pavement spots and minimum 3 days prior to applying traffic lines.

### 39.3 EXISTING WORK

- A. Remove existing markings in an acceptable manner. Do not remove existing pavement markings by painting over with blank paint. Remove by methods that will cause least damage to pavement structure or pavement surface. Satisfactorily repair any pavement or surface damage caused by removal methods.
- B. Clean and repair existing or reinstalled lines and legends.

### 39.4 APPLICATION

- A. Agitate paint for 1-15 minutes prior to application to ensure even distribution of paint pigment.
- B. Dispense paint at ambient 130 degrees F to wet-film thickness of 15 mils, except dispense edge markings to wet-film thickness of 12 mils.
- C. Apply glass beads at rate of 6 pounds per gallon of paint.
- D. Apply markings to indicated dimensions at indicated locations.
- E. Prevent splattering and over spray when applying markings.
- F. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.
- G. Collect and legally dispose of residues from painting operations.
- H. Install Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

### 39.5 APPLICATION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Wet Film Thickness: 1 mil.
- C. Maximum Variation from Wet Paint Line Width: Plus or minus 1/8 inch.
- D. Maintain cycle length for skip lines at tolerance of plus or minus 6-inches per 40-feet and line length of plus or minus 3-inches per 10-feet.
- E. Maximum Variation from Specified Application Temperature: Plus or minus 5 degrees F.

### 39.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

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- B. Inspect for incorrect location, insufficient thickness, line width, coverage, retention, uncured or discolored material, and insufficient bonding.
- C. Repair lines and markings, which after application and curing do not meet following criteria:
  - 1. Incorrect Location: Remove and replace incorrectly placed patterns.
  - 2. Insufficient Thickness, Line Width, Paint Coverage, Glass Bead Coverage or Retention: Prepare defective material by acceptably grinding or blast cleaning to remove substantial amount of beads and to roughen marking surface. Remove loose particles and debris. Apply new markings on cleaned surface in accordance with this Section.
  - 3. Uncured or Discolored Material, Insufficient Bonding: Remove defective markings in accordance with this Section and clean pavement surface one foot beyond affected area. Apply new markings on cleaned surface in accordance with this Section.
- D. Replace defective pavement markings as specified throughout 3 year warranted period. Replace markings damaged by anti-skid materials, studded tires, tire chains, chemical deicers, snow plowing or other loss of marking material regardless of cause. When markings are damaged by pavement failure or by Owner's painting, crack sealing, or pavement repair operations, Contractor is released from warranty requirements for damaged work.
- E. A three member team will evaluate warranty provisions. Team will consist of one member from Owner, one member from Contractor, and third person who is mutually acceptable to Owner and Contractor. Any costs for third person will be equally shared between Owner and Contractor. At least once each year, beginning with year after acceptance, team shall:
  - 1. Observe Owner taking readings by retroreflectometer, or review Owner records of such evaluation. The number of readings will be as large as necessary to ensure that minimum criteria are satisfied. Readings will be during period from March 15 through October, when pavement is clean and dry.
  - 2. Determine color fade, discoloration or pigment loss based on visual color comparison between original sample plates with glass beads and in-place pavement markings.
  - 3. Determine magnitude of material loss.
- F. Prepare list of defective areas and areas requiring additional inspection and evaluation to decide where material may need replaced. Provide traffic control as necessary if markings require more detailed evaluation.
- G. Replace failed or defective markings in entire section of defective markings within 30 days after notification when any of the following exists during warranty period:
  - 1. Average retro reflectivity within any 528 foot section is less than 1225 mcd/m<sup>2</sup>/1x for white pavement markings and 100 mcd/m<sup>2</sup>/1x for yellow pavement markings.
  - 2. Marking is discolored or exhibits pigment loss, and is determined to be unacceptable by three member team based on visual comparison with beaded color plates.
  - 3. More than 15 percent of area of continuous line, or more than 15 percent of combined area of skip lines, within any 528 foot section of roadway is missing.

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- H. Replace pavement marking material under warranty using original or better type material. Continue warranty to end of original 3 year period even when replacement materials have been installed as specified.
- I. When eradication of existing paint lines is necessary, eradicate by shot blast or water blast method. Do not gouge or groove pavement more than 1/16 inch during removal. Limit area of removal to area of marking plus 1 inch on all sides. Prevent damage to transverse and longitudinal joint sealers, and repair any damage according to requirements in Section 32 13 13 or Section 32 12 16.
- J. Maintain daily log showing work completed, results of above inspections or tests, pavement and air temperatures, relative humidity, presence of any moisture on pavement, and any material or equipment problems. Make legible entries in log in ink, sign and submit by end of each work day. Enter environmental data into log prior to starting work each day and at two additional times during day.

**39.7 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect painted pavement markings from vehicular and pedestrian traffic until paint is dry and track free. Follow manufacturer's recommendations or use minimum of 30 minutes. Consider barrier cones as satisfactory protection for materials requiring more than 2 minutes dry time.

**END OF SECTION**



## SECTION 32 31 13

### CHAIN LINK FENCES AND GATES

#### PART 40 GENERAL

##### 40.1 SUMMARY

- A. Section Includes:
  - 1. Fence framework, fabric, and accessories.
  - 2. Excavation for post bases.
  - 3. Concrete foundation for posts.
  - 4. Manual gates and related hardware.
  - 5. Privacy slats.
- B. Related Sections:
  - 1. Section 33 79 00 - Site Grounding.

##### 40.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fencing:
  - 1. Basis of Measurement: By linear foot to fence height specified, based on specified post spacing.
  - 2. Basis of Payment: Includes posts, rails, tension wire, fabric, accessories, and attachments.
- B. Post Footings:
  - 1. Basis of Measurement: Each unit footing, to depth specified.
  - 2. Basis of Payment: Includes excavation, concrete placed, finishing.
- C. Gates:
  - 1. Basis of Measurement: By square foot for each specified type.
  - 2. Basis of Payment: Includes frame posts, fabric, accessories, hardware.

##### 40.3 REFERENCES

- A. ASTM International:
  - 1. ASTM A121 - Standard Specification for Zinc-Coated (Galvanized) Steel Barbed Wire.
  - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 3. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 4. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
  - 5. ASTM A491 - Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric.
  - 6. ASTM A585 - Standard Specification for Aluminum-Coated Steel Barbed Wire.

- 7. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- 8. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- 9. ASTM B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- 10. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- 11. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
- 12. ASTM F668 - Standard Specification for Poly (Vinyl Chloride) (PVC)-Coated Steel Chain Link Fence Fabric.
- 13. ASTM F900 - Standard Specification for Industrial and Commercial Swing Gates.
- 14. ASTM F934 - Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
- 15. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
- 16. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.
- 17. ASTM F1184 - Standard Specification for Industrial and Commercial Horizontal Slide Gates.

- B. Chain Link Fence Manufacturers Institute:
  - 1. CLFMI - Product Manual.

**40.4 SYSTEM DESCRIPTION**

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- A. Fence Height: as indicated on Drawings.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Fence Post and Rail Strength: Conform to ASTM F1043 Light Industrial Fence quality.

**40.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, gates, and schedule of components.
- C. Product Data: Submit data on fabric, posts, accessories, fittings and hardware.
- D. Manufacturer’s Installation Instructions: Submit installation requirements.

**40.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

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- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for [salvaged] [and] [reused] products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

**40.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.
- C. Operation and Maintenance Data: Procedures for submittals.

**40.8 QUALITY ASSURANCE**

- A. Supply material in accordance with CLFMI - Product Manual.
- B. Perform installation in accordance with ASTM F567.
- C. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content, where possible.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- D. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

**40.9 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 3 years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience.

**40.10 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.
- C. Identify each package with manufacturer's name.
- D. Store fence fabric and accessories in secure and dry place.

**PART 41 PRODUCTS****41.1 MATERIALS AND COMPONENTS**

- A. Materials and Components: Conform to CLFMI Product Manual.
- B. Fabric Size: CLFMI Standard Industrial and Tennis Court service.
- C. Intermediate Posts: Type I round, Type II round and TC rolled shape.
- D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round, Type II round and TC rolled shape.

**41.2 ACCESSORIES**

- A. Caps: Cast steel galvanized sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; galvanized steel.
- C. Extension Arms: Cast steel galvanized, to accommodate 6 strands of barbed wire, single arm, sloped to 45 degrees.
- D. Gate Hardware: Fork latch with gravity drop, center gate stop and drop rod, or mechanical keepers (per Architect); two 180-degree gate hinges for each leaf and hardware for padlock keyed to match hardware specified in Section 08 71 00.

**41.3 GATES**

- A. General:
  - 1. Gate Types, Opening Widths and Directions of Operation: As indicated on Drawings.
  - 2. Factory will assemble gates.
  - 3. As applies, conform to requirements specified for PVC coated steel chain link fence except that PVC coated aluminum alloy framing conforming to ASTM B429 may be used.
  - 4. Design gates for operation by one person.

- B. Swing Gates:

1. Fabricate gates to permit 180 degree swing.
2. Gates Construction: ASTM F900 with welded corners. Use of corner fittings is not permitted.

#### **41.4 PRIVACY SLATS**

1. Privacy Slats: Vinyl strips, flat configuration, sized to fit fence fabric, color (as per Architect).

#### **41.5 FINISHES**

- A. Components and Fabric: Galvanized to ASTM A123/A123M for components; ASTM A153/A153M for hardware; ASTM A392 for fabric; 2.0 oz/sq ft coating.
- B. Hardware: Galvanized to ASTM A153/A153M, 2.0 oz/sq ft coating.
- C. Accessories: Same finish as framing.

### **PART 42 EXECUTION**

#### **42.1 INSTALLATION**

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Set intermediate, terminal and gate posts plumb, in concrete footings with top of footing 6 inches below finish grade. Slope top of concrete for water runoff.
- C. Line Post Footing Depth Below Finish Grade: ASTM F567.
- D. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567.
- E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.
- F. Install top rail through line post tops and splice with 6 inch long rail sleeves.
- G. Install center and bottom brace rail on corner gate leaves.
- H. Place fabric on outside of posts and rails.
- I. Do not stretch fabric until concrete foundation has cured 28 days.
- J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.
- K. Position bottom of fabric 2 inches above finished grade.
- L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

**42.2** Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

- A. Install bottom tension strap stretched taut between terminal posts.
- B. Install support arms sloped outward and attach barbed wire; tension and secure.
- C. Support gates from gate posts. Do not attach hinged side of gate from building wall.
- D. Install gate with fabric and barbed wire overhang to match fence. Install three hinges on each gate leaf, latch, catches, drop bolt, foot bolts and sockets, torsion spring retainer and locking clamp.
- E. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.
- F. Connect to existing fence at new terminal post.
- G. Install posts with 6 inches maximum clear opening from end posts to buildings, fences and other structures.
- H. Reuse holes resulting from removal of existing post footings for installation of new posts.
- I. Center and align posts. Place concrete around posts, and vibrate or tamp for consolidation. Verify vertical and top alignment of posts and make necessary corrections.
- J. Extend concrete footings 1 inches above grade, and trowel, forming crown to shed water.
- K. Allow footings to cure minimum 7 days before installing fabric and other materials attached to posts.

**42.3 PRIVACY SLATS**

- A. Install slat inserts in pattern woven through fence fabric as instructed by Architect.
- B. Fasten slats according to manufacturers instructions.

**42.4 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb  $\frac{1}{4}$ -inch.
- C. Maximum Offset From Indicated Position: 1- inch.
- D. Minimum distance from property line: 6- inches. **END OF SECTION**

## SECTION 32 84 00

### PLANTING IRRIGATION

#### PART 43 GENERAL

##### 43.1 SUMMARY

- A. Section Includes:
  - 1. Trenching.
  - 2. Pipe and fittings.
  - 3. Valves.
  - 4. Outlet heads and accessories.
  - 5. Control system.
  
- B. Related Sections:
  - 1. Section 26 05 03 - Equipment Wiring Connections: Power supply connections.
  - 2. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
  - 3. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
  - 4. Section 31 23 17 - Trenching: Excavating and backfilling for irrigation piping.
  - 5. Section 31 23 23 - Fill: Backfilling utility structures.
  - 6. Section 32 91 19 - Landscape Grading.

##### 43.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Piping:
  - 1. Basis of Measurement: By the linear foot.
  - 2. Basis of Payment: Includes trenching, placing pipe and fittings, valves, control box, conduit and wiring, and accessories.
  
- B. Sprinkler Heads:
  - 1. Basis of Measurement: By each.
  - 2. Basis of Payment: Includes sprinkler head and fittings.

##### 43.3 REFERENCES

- A. ASTM International:
  - 1. ASTM B32 - Standard Specification for Solder Metal.
  - 2. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes.
  - 3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  - 4. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  - 5. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
  - 6. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

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- B. National Electrical Manufacturers Association:
  - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- C. American Society of Irrigation Consultants:
  - 1. ASIC Guideline 100-2002 (January 2, 2002) For Earth Grounding Electronic Equipment in Irrigation Systems.

**43.4 SYSTEM DESCRIPTION**

- A. Underground Irrigation System: Per Civil Drawings.
- B. Source Power: Per Civil Drawings
- C. Low Voltage Controls: Per Civil Drawings

**43.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate piping layout to water source, location of sleeves under pavement, location and coverage of sprinkler heads, components, plant and landscaping features, site structures, schedule of outlets and fittings to be used.
- C. Product Data: Submit component and control system and wiring diagrams.
- D. Samples: Submit one outlet of each type, with housing. Accepted samples may not be used in the Work.

**43.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for salvaged and reused products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.



**43.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Provide an as-built survey tied to state plain coordinates for the locations of all equipment.
- C. Operation and Maintenance Data:
  - 1. Submit instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
  - 2. Submit schedule indicating length of time each valve is required to be open to deliver determined amount of water.

**43.8 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content, where available.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with Local government, NCDENR – Public Water Supply Section and NCDOT Manual of Specifications, Latest Edition.

**43.9 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

**43.10 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene one week prior to commencing Work of this section

**43.11 FIELD MEASUREMENTS**

- A. Verify field measurements on shop drawings.

**43.12 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate the Work with site backfilling, landscape grading and delivery of plant life.

**43.13 EXTRA MATERIALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for extra materials.

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- B. Furnish the following:
  - 1. Six sprinkler heads of each type and size.
  - 2. Two valve keys for manual valves.
  - 3. Six valve box keys.
  - 4. Two keys for valve markers.
  - 5. Two wrenches for each type head core and for removing and installing each type head.

**PART 44 PRODUCTS****44.1 PIPE MATERIALS**

- A. PVC Pipe: ASTM D2241, SDR 21 or 26; 200 psi pressure rated; solvent welded sockets.
- B. Fittings: Type and style of connection to match pipe.
- C. Solvent Cement: ASTM D2564 for PVC pipe and fittings
- D. Sleeve Material: PVC.

**44.2 OUTLETS**

- A. Manufacturers:
  - 1. Hunter Industries, Inc.
  - 2. Rain Bird Corporation
  - 3. The Toro Company
  - 4. Approved Equal.
  - 5. Substitutions: Section 01 60 00 - Product Requirements.
- B. Outlets: Brass construction.
- C. Rotary Type Sprinkler Head: Pop-up type with screens; fully adjustable for flow and pressure; size as indicated on Drawings; with letter or symbol designating degree of arc and arrow indicating center of spray pattern.
- D. Spray Type Sprinkler Head: Pop-Up head with full circle or half circle pattern.
- E. Emitter: Adjustable outlet, non-clogging, with two trickle tubes.
- F. Bubbler: Adjustable outlet.
- G. Quick Coupler

**44.3 MANUAL VALVES**

- A. Manufacturers:
  - 1. American Valve
  - 2. FMC Crosby Valve
  - 3. Red-White Valve Corp.
  - 4. Substitutions: Section 01 60 00 - Product Requirements

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- B. Ball Valves: Bronze construction, inside screw with threaded ends.
- C. Backflow Preventers: Brass body construction, reduced pressure zone (RPZ) type.
- D. Valve Box and Cover
- E. Drain Valve

**44.4 CONTROLS AND CONTROL VALVES**

- A. Manufacturers:
  - 1. Hunter Industries, Inc.
  - 2. Rain Bird Corporation
  - 3. The Toro Company
  - 4. Substitutions: Section 01 60 00 - Product Requirements.
- B. Controller: Automatic controller, microprocessor solid state control with visible readout display, temporary override feature to bypass cycle for inclement weather, timer for 6 station system, programmable for 7 days in quarter hour increments, with automatic start and shutdown.
- C. Controller Housing: NEMA 250 Type 3R; weatherproof, watertight, with lockable access door.
- D. Valves: Hydraulic; normally open; hydraulic tubing, including required fittings and accessories.
- E. Wire Conductors: Color-coded copper conductor, direct burial type.
- F. Rain Sensors

**44.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS**

- A. Electrical Characteristics: In accordance with Section 26 05 03.
- B. Disconnect Switch: Factory mount disconnect switch in control panel.

**PART 45 EXECUTION****45.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify location of existing utilities.
- C. Verify required utilities are available, in proper location, and ready for use.

#### 45.2 PREPARATION

- A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.
- B. Layout and stake locations of system components.
- C. Review layout requirements with other affected work. Coordinate locations of sleeves [under paving] to accommodate system.

#### 45.3 TRENCHING

- A. Trench in accordance with Section 31 23 17.
- B. Trench Size:
  - 1. Minimum Width: 6 inches.
  - 2. Minimum Depth of Installed Supply Piping: the greater of 36 inches or 18 inches below freeze line.
  - 3. Minimum Depth of Installed Branch Piping: the greater of 24 inches or 18 inches below freeze line.
  - 4. Minimum Depth of Installed Outlet Piping: the greater of 36 inches or 18 inches below freeze line.
- C. Trench to accommodate grade changes.
- D. Maintain trenches free of debris, material, or obstructions damaging to pipe.

#### 45.4 INSTALLATION

- A. Connect to utilities.
- B. Set outlets and box covers at finish grade elevations.
- C. Provide for thermal movement of components in system.
- D. Slope piping for self drainage to drainage pit.
- E. Use threaded nipples for risers to each outlet.
- F. Install control wiring in accordance with Section 26 05 19. Provide 10 inch expansion coil at each control valve, and at 100 ft intervals. Bury wire tubing beside pipe. Mark valves with neoprene valve markers containing locking device. Set valve markers in 200 psi PVC pipe risers exiting from top of valve to finish grade.
- G. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.
- H. Coordinate pipe installation and conduit installation.

#### **45.5 BACKFILLING**

- A. Backfill with fill in accordance with Section 31 23 17.
- B. Install 3 inch sand cover over piping.
- C. Protect piping from displacement.

#### **45.6 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Prior to backfilling, test system for leakage for whole system to maintain 100 psi pressure for one hour.
- C. System is acceptable when no leakage or loss of pressure occurs and system self drains during test period.
- D. Provide a complete “Spring Season” start-up and a complete “Fall Season” shutdown.

#### **45.7 ADJUSTING**

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust control system to achieve time cycles required
- C. Adjust head types for full water coverage as directed by Architect/Engineer.

#### **45.8 DEMONSTRATION AND TRAINING**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.
- B. Instruct Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance material as basis for demonstration.

#### **45.9 SCHEDULES**

- A. Baseball Field, Football Field, Soccer Field, Softball Field, Field 1 and Field 2 are the only areas to receive Irrigation Systems.
- B. Install heads based upon layouts included in Plan Set.

**END OF SECTION**



**SECTION 32 91 13**  
**SOIL PREPARATION**

**PART 46 GENERAL**

**46.1 SUMMARY**

- A. Section Includes:
  - 1. Preparation of subsoil.
  - 2. Soil testing.
  - 3. Placing topsoil.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading: Rough grading of site.
  - 2. Section 31 23 17 - Trenching: Rough grading over cut.
  - 3. Section 32 05 13 - Soils for Exterior Improvements: Topsoil material.
  - 4. Section 32 84 00 - Planting Irrigation.
  - 5. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
  - 6. Section 32 92 19 - Seeding
  - 7. Section 32 92 23 - Sodding.
  - 8. Section 32 93 00 - Plants.

**46.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Grassed Areas:
  - 1. Basis of Measurement: By square foot.
  - 2. Basis of Payment: Includes preparation of topsoil or placement of topsoil.

**46.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
  
- B. Submit minimum 10oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
  
- C. Test Reports: Indicate topsoil nutrient and pH levels with recommended soil supplements and application rates.
  
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

**46.4 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

**46.5 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with Local government and NCDOT Manual of Specifications, Latest Edition.
- C. Maintain one copy of each document on site.

**46.6 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate with installation of underground sprinkler system piping and watering heads.

**PART 47 PRODUCTS**

**47.1 SOIL MATERIALS**

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 6.0 and maximum 7.0.

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Topsoil: Excavated from site and free of weeds.



- A. Edging: Galvanized steel.

### **47.3 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- D. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

## **PART 48 EXECUTION**

### **48.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared soil base is ready to receive the Work of this section.

### **48.2 PREPARATION OF SUBSOIL**

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.
- C. Scarify subsoil to depth of 4 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

### **48.3 PLACING TOPSOIL**

- A. Spread topsoil to minimum depth of 6 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

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E. Install edging at periphery of seeded areas in straight lines to consistent depth.

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**END OF SECTION**

**SECTION 32 91 19**  
**LANDSCAPE GRADING**

**PART 49 GENERAL**

**49.1 SUMMARY**

- A. Section Includes:
  - 1. Final grade topsoil for finish landscaping.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading: Site contouring.
  - 2. Section 31 23 17 - Trenching: Backfilling trenches.
  - 3. Section 31 23 23 - Fill: Backfilling at building areas.
  - 4. Section 32 05 13 - Soils for Exterior Improvements.
  - 5. Section [32 92 19 - Seeding and Soil Supplements] [02925 - Sodding]: Finish ground cover.
  - 6. Section 32 93 00 - Plants: Topsoil fill for trees, plants and ground cover.

**49.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Topsoil:
  - 1. Basis of Measurement: By cubic yard.
  - 2. Basis of Payment: Includes excavating existing topsoil, supplying topsoil materials, stockpiling, preparing and scarifying substrate surface, placing where required, and rolling.

**49.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures
  
- B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
  
- C. Materials Source: Submit name of imported materials source.
  
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

**49.4 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

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- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

**49.5 QUALITY ASSURANCE**

- A. Furnish each topsoil material from single source throughout the Work.
- B. Sustainable Design Requirements:
  - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform Work in accordance with Local government and NCDOT Manual of Specifications, Latest Edition.
- D. Maintain one copy on site.

**PART 50 PRODUCTS****50.1 MATERIAL**

- A. Topsoil: Fill as specified in Section 32 93 00.

**PART 51 EXECUTION****51.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify building and trench backfilling have been inspected.
- C. Verify substrate base has been contoured and compacted.

**51.2 PREPARATION**

- A. Protect landscaping and other features remaining as final Work.
- B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

### **51.3 SUBSTRATE PREPARATION**

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove contaminated subsoil.
- C. Scarify surface to depth of 4 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

### **51.4 PLACING TOPSOIL**

- A. Place topsoil in areas where seeding, sodding, and planting is required to thickness as scheduled. to nominal depth of 6 inches. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to plant material, and building to prevent damage.
- E. Lightly compact placed topsoil.
- F. Remove surplus subsoil and topsoil from site.
- G. Leave stockpile area and site clean and raked, ready to receive landscaping.

### **51.5 TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top of Topsoil: Plus or minus 1/2 inch.

### **51.6 PROTECTION OF INSTALLED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Prohibit construction traffic over topsoil.

### **51.7 SCHEDULES**

- A. Compacted topsoil thicknesses:
  - 1. Seeded Grass: 6 inches.
  - 2. Sod: 4 inches.
  - 3. Shrub Beds: 18 inches.
  - 4. Flower Beds: 12 inches.
  - 5. Planter Boxes: To within 3 inches of box rim.

**END OF SECTION**



## SECTION 32 92 19

### SEEDING

#### PART 52 GENERAL

##### 52.1 SUMMARY

- A. Section Includes:
  - 1. Fertilizing.
  - 2. Seeding.
  - 3. Hydroseeding.
  - 4. Mulching.
  - 5. Maintenance.
  
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading: Rough grading of site.
  - 2. Section 31 23 17 - Trenching: Rough grading over cut.
  - 3. Section 32 05 13 - Soils for Exterior Improvements: Topsoil material.
  - 4. Section 32 84 00 - Planting Irrigation.
  - 5. Section 32 91 13 - Soil Preparation
  - 6. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
  - 7. Section 32 92 23 - Sodding.
  - 8. Section 32 93 00 - Plants.

##### 52.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Grassed Areas:
  - 1. Basis of Measurement: By square foot.
  - 2. Basis of Payment: Includes seeding, watering and maintenance for a period of one year.

##### 52.3 REFERENCES

- A. ASTM International:
  - 1. ASTM C602 - Standard Specification for Agricultural Liming Materials.

##### 52.4 DEFINITIONS

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- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Weeds: Vegetative species other than specified species to be established in given area.

**52.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

**52.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

**52.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

**52.8 QUALITY ASSURANCE**

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.
- B. Sustainable Design Requirements:



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- 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- C. Perform Work in accordance with Local government and NCDOT Manual of Specifications, Latest Edition
- D. Maintain one copy of each document on site.

**52.9 QUALIFICATIONS**

- A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

**52.10 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

**52.11 MAINTENANCE SERVICE**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Maintain seeded areas for 12 months from Date of Final Completion.

**PART 53 PRODUCTS**

**53.1 SEED MIXTURE**

- A. Furnish materials in accordance with Local government and NCDOT Manual of Specifications, Latest Edition.
- B. Seed Mixture:

Merion Blue Grass	10 percent
Kentucky Blue Grass	10 percent
Creeping Red Fescue Grass	20 percent
Streambark Wheat	30 percent

Red Top	10 percent
Norlea Perennial Rye	20 percent
Clover	0 percent

### 53.2 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Mulching Material: Hemlock species wood cellulose fiber, free of growth or germination inhibiting ingredients.
- C. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil, as indicated in analysis to the following proportions:  
Nitrogen: 8 percent, phosphoric acid 8 percent, soluble potash 8 percent.
- D. Lime: ASTM C602, Class T agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- E. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.
- F. Erosion Fabric: Jute matting, open weave.
- G. Herbicide: As needed.
- H. Stakes: Softwood lumber, chisel pointed.
- I. String: Inorganic fiber.

### 53.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.
- D. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

#### **54.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared soil base is ready to receive the Work of this section.

#### **54.2 FERTILIZING**

- A. Apply lime at application rate recommended by soil analysis. Work lime into top 6 inches of soil.
- B. Apply fertilizer at application rate recommended by soil analysis.
- C. Apply after smooth raking of topsoil and prior to roller compaction.
- D. Do not apply fertilizer at same time or with same machine used to apply seed.
- E. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- F. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

#### **54.3 SEEDING**

- A. Apply seed at rate of 10 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Planting Season: Per grass seed.
- D. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.
- E. Roll seeded area with roller not exceeding 112 lbs/linear foot.
- F. Immediately following seeding and compacting, apply mulch to thickness of 1/8 inches. Maintain clear of shrubs and trees.
- G. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

#### **54.4 HYDROSEEDING**

- A. Apply fertilizer, mulch and seeded slurry with hydraulic seeder at rate of 10 lbs per 1000 sq ft evenly in one pass.
- B. After application, apply water with fine spray immediately after each area has been hydroseeded. Saturate to 4 inches of soil and maintain moisture levels two to four inches.

#### **54.5 SEED PROTECTION**

- A. Identify seeded areas with stakes and string around area periphery. Set string height to 24 inches. Space stakes at 20 feet.
- B. Cover seeded slopes where grade is 2:1 or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.
- C. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Overlap edges and ends of adjacent rolls minimum 12 inches. Backfill trench and rake smooth, level with adjacent soil.
- D. Secure outside edges and overlaps at 36 inch intervals with stakes.
- E. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.
- F. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 6 inches.

#### **54.6 MAINTENANCE**

- A. Mow grass at regular intervals to maintain at maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at each mowing. Perform first mowing when seedlings are 40 percent higher than desired height.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming. Do not let clippings lay in clumps.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove minor depressions or irregularities.
- F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.
- G. Immediately reseed areas showing bare spots.
- H. Repair washouts or gullies.
- I. Protect seeded areas with warning signs during maintenance period.

#### **54.7 SCHEDULE**

- A. Front Seeded Area: Grass seed mixture specified, 4 inches top soil.
- B. Rear Seeded Area: Grass seed mixture specified except substitute Clover for Kentucky Blue Grass, 4 inches top soil.

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**END OF SECTION**



## SECTION 32 92 23

### SODDING

#### PART 55 GENERAL

##### 55.1 SUMMARY

- A. Section Includes:
  - 1. Preparation of subsoil.
  - 2. Placing topsoil.
  - 3. Fertilizing.
  - 4. Sod installation.
  - 5. Maintenance.
  
- B. Related Sections:
  - 1. Section 31 23 17 - Trenching: Rough grading over cut.
  
  - 2. Section 31 23 23 - Fill: Rough grading of site.
  - 3. Section 32 05 13 - Soils for Exterior Improvements: Topsoil material.
  - 4. Section 32 84 00 - Planting Irrigation.
  - 5. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
  - 6. Section 32 92 19 - Seeding and Soil Supplements.
  - 7. Section 32 93 00 - Plants.

##### 55.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Sodded Areas:
  - 1. Basis of Measurement: By square yard.
  - 2. Basis of Payment: Includes preparation of subsoil, topsoil, placing topsoil, sodding, watering and maintenance to one year from substantial completion.

##### 55.3 REFERENCES

- A. ASTM International:
  - 1. ASTM C602 - Standard Specification for Agricultural Liming Materials.
  
- B. Turfgrass Producers International:
  - 1. TPI - Guideline Specifications to Turfgrass Sodding.

##### 55.4 DEFINITIONS

- A. Weeds: Vegetative species other than specified species to be established in given area.

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for sod grass species, fertilizer, mulch, and other accessories.
- C. Submit minimum 10 oz sample of topsoil proposed. Forward sample to approved testing laboratory in sealed containers to prevent contamination.
- D. Test Reports: Indicate topsoil nutrient and pH levels with recommended soil supplements and application rates.
- E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### **55.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

#### **55.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Submit maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

#### **55.8 QUALITY ASSURANCE**

- A. Sod: Root development capable of supporting its own weight without tearing, when suspended vertically by holding upper two corners.
- B. Sustainable Design Requirements:
  - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.



- C. Perform Work in accordance with Local government and NCDOT Manual of Specifications, Latest Edition.
  
- D. Maintain one copy of each document on site.

### **55.9 QUALIFICATIONS**

- A. Sod Producer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

### **55.10 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver sod in rolls. Protect exposed roots from dehydration.
- C. Do not deliver more sod than can be laid within 24 hours.

### **55.11 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate with installation of underground sprinkler system piping and watering heads.

### **55.12 MAINTENANCE SERVICE**

- A. Section 01 70 00 - Execution and Closeout Requirements: Maintenance service.
- B. Maintain sodded areas for twelve months from Date of Final Completion.

## **PART 56 PRODUCTS**

### **56.1 SOD**

- A. Sod Growers:
  - 1. Approved Growers.
  - 2. Substitutions: Section 01 60 00 - Product Requirements.
- B. Sod: Approved grade; cultivated grass sod; type indicated in plant schedule on Drawings; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft.

- A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; pH value of minimum 6.0 and maximum 7.0.

### **56.3 ACCESSORIES**

- A. Fertilizer: Commercial grade; recommended for grass, with fifty percent of elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil [to the following proportions: nitrogen 8 percent, phosphoric acid 8 percent, soluble potash 8 .
- B. Lime: ASTM C602, Class T agricultural limestone containing a minimum 80 percent calcium carbonate equivalent.
- C. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.
- D. Wood Pegs: Softwood, sufficient size and length to anchor sod on slope.
- E. Wire Mesh: Interwoven hexagonal plastic mesh of 2 inch size.
- F. Edging: Galvanized steel.
- G. Herbicide: As needed.

### **56.4 HARVESTING SOD**

- A. Machine cut sod in accordance with TPI.
- B. Cut sod in area not exceeding 1 sq yd, with minimum 1/2 inch and maximum 1 inch topsoil base.

### **56.5 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.
- C. Provide recommendation for fertilizer and lime application rates for specified sod grass species as result of testing.
- D. Testing is not required when recent tests are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

### **57.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared soil base is ready to receive the Work of this section.

### **57.2 PREPARATION OF SUBSOIL**

- A. Prepare sub-soil and eliminate uneven areas and low spots.
- B. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- C. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.
- D. Remove contaminated subsoil.
- E. Scarify sub-soil to depth of 4 inches where topsoil is to be placed.
- F. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

### **57.3 PLACING TOPSOIL**

- A. Spread topsoil to minimum depth of 4 inches over area to be sodded.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas and to ensure positive drainage.
- E. Install edging at periphery of sodded areas in straight lines to consistent depth.

### **57.4 FERTILIZING**

- A. Apply lime at application rate recommended by soil analysis.
- B. Apply fertilizer at application rate recommended by soil analysis.
- C. Apply fertilizer after smooth raking of topsoil and prior to installation of sod.
- D. Apply fertilizer no more than 48 hours before laying sod.
- E. Mix fertilizer thoroughly into upper 4 inches of topsoil.

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- F. Lightly water soil to aid dissipation of fertilizer.

**57.5 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod within 24 hours after harvesting to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Align with adjoining grass areas.
- E. Place top elevation of sod 1/2 inch below adjoining edging, paving, curbs.
- F. On slopes 3:1 and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. When using “big roll”, lay sod parallel to slope. Drive pegs flush with soil portion of sod.
- G. Do not place sod when temperature is lower than 32 degrees F.
- H. Prior to placing sod, on slopes exceeding 3:1, place wire mesh over topsoil. Securely anchor wire mesh in place with wood pegs sunk firmly into ground.
- I. Water sodded areas immediately after installation. Saturate sod to [4] [\_\_\_\_\_] inches of soil.
- J. After sod and soil have dried, roll sodded areas to bond sod to soil and to remove minor depressions and irregularities.
- K. Roll before first watering.

**57.6 MAINTENANCE**

- A. Mow grass at regular intervals to maintain at maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at each mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove or irregularities.
- F. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.

G. Immediately replace sod on areas showing deterioration or bare spots.

H. Protect sodded areas with warning signs during maintenance period.

### **57.7 SCHEDULE**

A. Front Sodded Area: Sod type specified, 3 inch top soil.

B. Rear Sodded Area: Sod type specified, 3 inch top soil.

**END OF SECTION**



## SECTION 32 93 00

### PLANTS

#### PART 58 GENERAL

##### 58.1 SUMMARY

- A. Section Includes:
  - 1. Preparation of subsoil and topsoil.
  - 2. Topsoil bedding.
  - 3. Trees, plants, and ground cover.
  - 4. Mulch.
  - 5. Fertilizer.
  - 6. Pruning.
  - 7. Maintenance.
  
- B. Related Sections:
  - 1. Section 31 23 17 - Trenching: Rough grading over trench cut.
  
  - 2. Section 31 23 23 - Fill: Rough grading of site.
  - 3. Section 32 05 13 - Soils for Exterior Improvements: Topsoil material.
  - 4. Section 32 84 00 - Planting Irrigation.
  - 5. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.
  - 6. Section 32 92 19 - Seeding and Soil Supplements.
  - 7. Section 32 92 23 - Sodding.
  
- C. Allowances: Include under provisions of Section 01 20 00 - Price and Payment Procedures. Allowance includes [furnishing of trees, plants and ground cover. Installation is included in this section and is part of Contract Sum/Price] [furnishing and installing of trees, plants and ground cover].

##### 58.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Plants:
  - 1. Basis of Measurement: By each.
  - 2. Basis of Payment: Includes [preparation of [subsoil] [topsoil],] [placing topsoil,] planting, watering and maintenance to specified time period.

##### 58.3 REFERENCES

- A. American National Standards Institute:

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1. ANSI A300 - Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance - Standard Practices.
2. ANSI Z60.1 - Nursery Stock.

## B. Forest Stewardship Council:

1. FSC Guidelines - Forest Stewardship Council Guidelines.

**58.4 DEFINITIONS**

- A. Weeds: Vegetative species other than specified species to be established in given area.
- B. Plants: Living trees, plants, and ground cover specified in this Section, and described in ANSI Z60.1.

**58.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit list of plant material sources, data for fertilizer and other accessories.
- C. Submit minimum 10 oz sample of topsoil proposed. Forward sample to testing laboratory in sealed containers to prevent contamination.

**58.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify source and origin for salvaged and reused products.
    - b. Certify source for local and regional materials and distance from Project site.
    - c. Certify lumber is harvested from Forest Stewardship Council Certified well managed forest.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Local and regional products.
    - d. Certified wood products.

**58.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.



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- B. Operation and Maintenance Data: Include pruning objectives, types and methods; types, application frequency, and recommended coverage of fertilizer.

**58.8 QUALITY ASSURANCE**

- A. Tree Pruning: ANSI A300 Pruning Standards for Woody Plants.
- B. Sustainable Design Requirements:
  - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
  - 2. Certified Wood Materials: Furnish wood materials certified in accordance with FSC Guidelines.
- C. Perform Work in accordance with Local government and NCDOT Manual of Specifications, Latest Edition.
- D. Maintain one copy of each document on site.

**58.9 QUALIFICATIONS**

- A. Nursery: Company specializing in growing and cultivating plants with three years documented experience.
- B. Installer: Company specializing in installing and planting plants with three years documented experience.
- C. Tree Pruner: Company specializing in performing work of this section with minimum three years documented experience.
- D. Maintenance Services: Performed by installer.

**58.10 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

**58.11 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Protect and maintain plant life until planted.

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- D. Deliver plant life materials immediately prior to placement. Keep plants moist.
- E. Plant material damaged as a result of delivery, storage or handling will be rejected.

**58.12 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install plant life when ambient temperatures may drop below 35 degrees F or rise above 90 degrees F.
- C. Do not install plant life when wind velocity exceeds 30 mph.

**58.13 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Install plant life after and coordinate with installation of underground irrigation system piping and watering heads specified in Section 32 84 00.

**58.14 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish one year manufacturer warranty for trees, plants, and ground cover.

**58.15 MAINTENANCE SERVICE**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.
- B. Maintain plant life for twelve months after Date of Substantial Completion.
- C. Maintenance includes:
  - 1. Cultivation and weeding plant beds and tree pits.
  - 2. Applying herbicides for weed control. Remedy damage resulting from use of herbicides.
  - 3. Remedy damage from use of insecticides.
  - 4. Irrigating sufficient to saturate root system.
  - 5. Pruning, including removal of dead or broken branches.
  - 6. Disease control.
  - 7. Maintaining wrapping, guys, [turnbuckles,] and stakes. [Adjust turnbuckles to keep guy wires tight.] Repair or replace accessories when required.
  - 8. Replacement of mulch.

### **59.1 TREES, PLANTS, AND GROUND COVER**

- A. Planting Stock:
  - 1. Species: In accordance with Standardized Plant Names, official code of American Joint Committee on Horticulture Nomenclature.
  - 2. Identification: Label individual plants or each bundle of plants when tied in bundles.
  - 3. Plants: No. 1 Grade conforming to “American Standard for Nursery Stock” of American Association of Nurserymen (AAN); well-branched, vigorous and balanced root and top growth; free from disease, injurious insects, mechanical wounds, broken branches, decay and other defects.
  - 4. Trees: Furnish with reasonably straight trunks, well balanced tops, and single leader.
  - 5. Deciduous plants: Furnish in dormant state, except those specified as container grown.
- B. Trees, Plants and Ground Cover: Species and size identifiable in plant schedule, grown in climatic conditions similar to those in locality of the Work.

### **59.2 SOIL MATERIALS**

- A. Topsoil: As specified in Section 32 05 13

### **59.3 SOIL AMENDMENT MATERIALS**

- A. When soil tests indicate soil amendment, apply soil conditioners or fertilizers to amend soil to specified conditions.
  - 1. Tree Fertilizer: Containing fifty percent of elements derived from organic sources; of proportion necessary to eliminate deficiencies of topsoil as indicated in analysis.
- B. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 85 percent organic material measured by oven dry weight, pH range of 4 to 5 ; moisture content of 30 percent.
- C. Bone Meal: Raw, finely ground, commercial grade, minimum of 3 percent nitrogen and 20 percent phosphorous.
- D. Lime: Ground limestone, dolomite type, minimum 95 percent carbonates.
- E. Water: Clean, fresh, and free of substances or matter capable of inhibiting vigorous growth of plants.
- F. Herbicide: As Needed.
- G. Pesticide: As Needed.

### **59.4 MULCH MATERIALS**

- A. Mulching Material: Composted, shredded hardwood bark, dark brown in color.

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.
- C. Cable, Wire, Eye Bolts: Non-corrosive, of sufficient strength to withstand wind pressure and resulting movement of plant life.
- D. Plant Protectors: Rubber sleeves over cable to protect plant stems, trunks, and branches.
- E. Decorative Cover: Smooth gravel] 1 inch minimum and 3 inch maximum size.
- F. Membrane: 20 mil thick, black polyethylene.
- G. Wrapping: Waterproof fabric
- H. Tree Protectors: Plastic with galvanized rings.

#### **59.6 PLANT SOIL MIX**

- A. Plant Soil Mix: Uniform mixture of 1 part peat and 3 parts topsoil by volume.

#### **59.7 SOURCE QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Test and analyze [imported] [existing] topsoil.
- C. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt and organic matter; and pH value.
- D. Provide recommendation for fertilizer and soil amendment application rates for specified planting as result of testing.
- E. Testing is not required when recent tests are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

### **PART 60 EXECUTION**

#### **60.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared subsoil and planters are ready to receive work.
- C. Saturate soil with water to test drainage.

- D. Verify required underground utilities are available, in proper location, and ready for use.

## **60.2 PREPARATION OF SUBSOIL**

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to depth of 4 inches where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- D. Dig pits and beds three times wider than plant root system.

## **60.3 PLACING TOPSOIL**

- A. Spread topsoil to minimum depth of 6 inches over area to be planted. Rake smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.
- E. Install topsoil into pits and beds intended for plant root balls, to minimum thickness of 6.

## **60.4 FERTILIZING**

- A. Apply starter fertilizer.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches of topsoil.
- D. Lightly water soil to aid dissipation of fertilizer.

## **60.5 PLANTING**

- A. Place plants for best appearance for review and final orientation by Architect/Engineer.
- B. Set plants vertical.
- C. Remove non-biodegradable root containers.
- D. Set plants in pits or beds, partly filled with prepared plant mix, at minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from top half of root ball.

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- E. Place bare root plant materials so roots lie in natural position. Backfill soil mixture in 6 inch layers. Maintain plant life in vertical position.
- F. Saturate soil with water when pit or bed is half full of topsoil and again when full.

**60.6 PLANT RELOCATION AND RE-PLANTING**

- A. Relocate plants as directed by Architect/Engineer.
- B. Ball or pot removed plants when temporary relocation is required.
- C. Replant plants in pits or beds, partly filled with prepared topsoil mixture, at minimum depth of 6 inches under each plant. Remove burlap, ropes, and wires, from top half of root ball.
- D. Place bare root plant materials so roots lie in natural position. Backfill soil mixture in 6 inch layers. Maintain plant materials in vertical position.
- E. Saturate soil with water when pit or bed is half full of topsoil and again when full.

**60.7 INSTALLATION OF ACCESSORIES**

- A. Place stone here indicated on Drawings
- B. Wrap deciduous shade and flowering tree trunks and place tree protectors.

**60.8 PLANT SUPPORT**

- A. Brace plants vertically with plant protector wrapped guy wires and stakes to the following:

Tree Caliper	Tree Support Method
1 inch	1 stake with one tie
1 - 2 inches	2 stakes with two ties
2 - 4 inches	3 guy wires
Over 4 inches	4 guy wires

**60.9 TREE PRUNING**

- A. When pruning trees is required, lightly prune trees in accordance with ANSI A300 Maintenance Pruning Type: Crown Cleaning.

**60.10 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirement 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Plants will be rejected when ball of earth surrounding roots has been disturbed or damaged prior to or during planting.

A. Plant Schedule:

See Civil Drawings for Plant Schedule.

**END OF SECTION**





## SECTION 33 05 13

### MANHOLES AND STRUCTURES

#### PART 61 GENERAL

##### 61.1 SUMMARY

- A. Section Includes:
1. Monolithic concrete manholes and structures with masonry transition to cover frame, covers, anchorage, and accessories.
  2. Modular precast concrete manhole and structures with tongue-and-groove joints with masonry transition to cover frame, covers, anchorage, and accessories.
  3. Monolithic FRP manholes and structures with transition to cover frame, covers, anchorage, and accessories.
  4. Masonry manholes and structures with masonry transition to cover frame, covers, anchorage, and accessories.
  5. Bedding and cover materials.
- B. Related Sections:
1. Section 31 05 13 - Soils for Earthwork: Soil for backfill in trenches.
  2. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
  3. Section 31 23 16 - Excavation: Excavating for manholes and structures.
  4. Section 31 23 23 - Fill: Backfilling after manhole and structure installation.
  5. Section 33 05 16 - Utility Structures.
  6. Section 33 71 19 - Electrical Underground Ducts and Manholes.

##### 61.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Manhole:
1. Basis of Measurement: By each unit.
  2. Basis of Payment: Includes excavating, concrete base pad, concrete manhole sections, cover frame and cover, to indicated depth, and forming and sealing pipe inlets and outlets.

##### 61.3 REFERENCES

- A. American Concrete Institute:
1. ACI 318 - Building Code Requirements for Structural Concrete.
  2. ACI 530/530.1 - Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.
- B. ASTM International:
1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
  2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  3. ASTM A536 - Standard Specification for Ductile Iron Castings.
  4. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

5. ASTM C55 - Standard Specification for Concrete Brick.
6. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale).
7. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
8. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
9. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
10. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
11. ASTM D3753 - Standard Specification for Glass-Fiber-Reinforced Polyester Manholes.

#### **61.4 DESIGN REQUIREMENTS**

- A. Equivalent Strength: Based on structural design of reinforced concrete as outlined in ACI 318.
- B. Design of Lifting Devices for Precast Components: In accordance with ASTM C913.
- C. Design of Joints for Precast Components: In accordance with ASTM C913; maximum leakage of 0.025 gallons per hour per foot of joint at 3 feet of head.

#### **61.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate manhole locations, elevations, piping and sizes and elevations of penetrations.
- C. Product Data: Submit cover and frame construction, features, configuration and dimensions.

#### **61.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify source and origin for [salvaged] [and] [reused] products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.

- c. Products with recycled material content.
- d. Local and regional products.

## **61.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications*, latest editions.

## **61.8 QUALIFICATIONS**

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

## **61.9 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes.
- C. Store precast concrete manholes to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- D. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

## **61.10 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Cold Weather Requirements: ACI 530.

## **PART 62 PRODUCTS**

### **62.1 MANHOLES**

- A. Manholes must be constructed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**62.2 FRAMES AND COVERS**

- A. Frames and covers must be constructed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**62.3 COMPONENTS**

- A. Manhole components must be constructed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**62.4 CONFIGURATION**

- A. Manhole dimensions and configurations must be constructed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**62.5 BEDDING AND COVER MATERIALS**

- A. Manhole bedding and cover materials must be constructed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**PART 63 EXECUTION****63.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify built-in items are in proper location, and ready for roughing into Work.
- D. Verify correct size of manhole excavation.

**63.2 PREPARATION**

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.
- C. Inspect precast concrete structures immediately prior to placement in excavation to verify structures are internally clean and free from damage. Remove and replace damaged units.

**63.3 INSTALLATION**

- A. Excavation and Backfill:
  - 1. Excavate for manholes [and structures] in accordance with Section 31 23 16 in location and to depth shown. Provide clearance around sidewalls of structure for construction operations.
  - 2. When groundwater is encountered, prevent accumulation of water in excavations. Place manholes [and structures] in dry trench.
  - 3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation.
- B. Place base pad, trowel top surface level.
- C. Install manholes supported at proper grade and alignment on crushed stone bedding as shown on Drawings.
- D. Backfill excavations for manholes in accordance with Section 31 23 16 and Section 31 23 23.
- E. Form and place manhole cylinder plumb and level, to correct dimensions and elevations.
- F. Cut and fit for pipe.
- G. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour to form continuous drainage channel as indicated on Drawings.
- H. Set cover frames and covers level without tipping, to correct elevations.
- I. Coordinate with other sections of Work to provide correct size, shape, and location.

**63.4 FRAME AND COVER INSTALLATION**

- A. Set frames using mortar and masonry. Install radially laid concrete brick with 1/4 inch thick vertical joints at inside perimeter. Lay concrete brick in full bed of mortar and completely fill joints. Where more than one course of concrete brick is required, stagger vertical joints.
- B. Set frame and cover 2 inches above finished grade for manholes [and structures] with covers located within unpaved areas to allow area to be graded away from cover beginning 1 inch below top surface of frame.

**63.5 FIELD QUALITY CONTROL**

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
- B. Test cast-in-place concrete in accordance with Section 03 30 00.
- C. Vertical Adjustment of Existing Manholes:
  - 1. Where required, adjust top elevation of existing manholes to finished grades shown on Drawings.

2. Reset existing frames, grates and covers, carefully removed, cleaned of mortar fragments, to required elevation in accordance with requirements specified for installation of castings.
  3. Remove concrete without damaging existing vertical reinforcing bars when removal of existing concrete wall is required. Clean vertical bars of concrete and bend into new concrete top slab or splice to required vertical reinforcement, as indicated Drawings.
- D. Clean and apply sand-cement bonding compound on existing concrete surfaces to receive cast-in-place concrete in accordance with Section 03 30 00.

**END OF SECTION**

**SECTION 33 05 16**  
**UTILITY STRUCTURES**

**PART 64 GENERAL**

**64.1 SUMMARY**

- A. Section includes precast concrete utility structures:
1. Drainage system catch basins.
  2. Drainage system inlets.
  3. Drainage system junction boxes.
  4. Drainage system sedimentation chambers.
  5. Drainage system retention/diversion structures.
  6. Sanitary sewer lift station pits.
  7. Sanitary sewer lift station valve chambers.
  8. Sanitary drain field dosing chambers.
  9. Knock out boxes.
  10. Single cell and multiple cell box culverts.
  11. Oil water separators.
  12. Grease interceptors.
  13. Acid retention basins.
  14. Triturator pits.
  15. Irrigation well pits.
  16. Valve pits.
  17. End walls.
  18. Pipe ends.
  19. Frames and covers.
  20. Access hatches.
- B. Related Sections:
1. Section 31 23 16 - Excavation: Excavating for structures and foundation slabs.
  2. Section 31 23 23 - Fill: Backfilling after structure installation.
  3. Section 33 31 00 - Sanitary Utility Sewerage Piping: Piping connections to structures.
  4. Section 33 31 13 - Public Sanitary Utility Sewerage Piping: Piping connections to structures.
  5. Section 33 41 00 - Storm Utility Drainage Piping: Piping connections to structures.
  6. Section 33 41 13 - Public Storm Utility Drainage Piping: Piping connections to structures.
  7. Section 33 42 13 - Pipe Culverts.
  8. Section 33 71 19 - Electrical Underground Ducts and Manholes: Electrical and communications utility structures.

**64.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Precast Concrete Utility Structures:
  - 1. Basis of Measurement: By each complete structure.
  - 2. Basis of Payment: Includes excavating, concrete foundation slab, concrete structure sections, cover frame and cover, to indicated depth, forming and sealing pipe inlets and outlets.

**64.3 REFERENCES**

- A. American Association of State Highway Transportation Officials:
  - 1. AASHTO M306 - Drainage Structure Castings.
  - 2. AASHTO S99-HB - Standard Specifications for Highway Bridges.
- B. American Concrete Institute:
  - 1. ACI 318 - Building Code Requirements for Structural Concrete.
  - 2. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
  - 3. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
- C. ASTM International:
  - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
  - 2. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
  - 3. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
  - 4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 5. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - 6. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
  - 7. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
  - 8. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 9. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
  - 10. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
  - 11. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - 12. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
  - 13. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
  - 14. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 15. ASTM C33 - Standard Specification for Concrete Aggregates.
  - 16. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.



17. ASTM C138 - Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
18. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
19. ASTM C150 - Standard Specification for Portland Cement.
20. ASTM C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
21. ASTM C192/C192M - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
22. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
23. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
24. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
25. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
26. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
27. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
28. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
29. ASTM C857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
30. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Section Precast Concrete Water and Wastewater Structures.
31. ASTM C891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.
32. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
33. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.
34. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
35. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
36. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
37. ASTM C1244 - Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.
38. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
39. ASTM C1433 - Standard Specification for Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers.
40. ASTM C1504 - Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts, Storm Drains, and Sewers.

D. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.
2. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

- E. Federal Aviation Administration:
  - 1. FAA AC 150/5320-6 - Airport Pavement Design and Evaluation.
  - 2. FAA AC 150/5370-10A - Standards for Specifying Construction for Airports.
- F. National Precast Concrete Association:
  - 1. NPCA Quality Control Manual for Precast Plants.
  - 2. NPCA Plant Certification Program.
- G. SSPC: The Society for Protective Coatings:
  - 1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

#### **64.4 DESIGN REQUIREMENTS**

- A. Design structures for minimum loads in accordance with ASTM C857 and ASTM C890.
  - 1. Roof Live Load: Comply with the following loading conditions, including impact load.
    - a. Heavy Traffic: ASTM C857; AASHTO S99-HB; HS20-44, maximum 16,000 lb each wheel.
    - b. Medium Traffic: ASTM C857; A-12, AASHTO S99-HB; HS15-44, maximum 12,000 lb each wheel.
    - c. Light Traffic: ASTM C857; A-8, AASHTO S99-HB; HS10, maximum 8,000 lb each wheel.
    - d. Walkway Traffic: ASTM C857; A-0.3, maximum 300 psf.
  - 2. Dead Loads: Actual weight of materials producing static load.

#### **64.5 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
  - 1. Indicate structure locations, elevations, sections, piping, sizes and elevations of penetrations.
  - 2. Indicate design, construction and installation details, typical reinforcement and additional reinforcement at openings.
- C. Product Data:
  - 1. Submit data for frames and covers, steps, component construction, features, configuration, and dimensions.
- D. Design Data:
  - 1. Submit concrete mix design for each different mix.
- E. Manufacturer's Certificate: Certify all Products meet or exceed specified requirements.

#### **64.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:
  - a. Certify source and origin for salvaged and reused products.
  - b. Certify recycled material content for recycled content products.
  - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### 64.7 QUALITY ASSURANCE

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design in accordance with ACI 318.
- C. Perform Work in accordance with NPCA Quality Control Manual for Precast Plants.
- D. Conform to the following for material and fabrication requirements:
  1. Single Cell Box Culverts: ASTM C1433.
  2. Three Sided Structures: ASTM C1504.
  3. Other Structures: ASTM C913.
- E. Perform welding in accordance with the following:
  1. Structural Steel: AWS D1.1.
  2. Reinforcing Steel: AWS D1.4.
- F. Sustainable Design Requirements:
  1. Recycled Content Materials: Furnish materials with recycled content.
  2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- G. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.

#### 64.8 QUALIFICATIONS

- A. Manufacturer: Certified by NPCA Plant Certification Program prior to and during Work of this section.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.
- C. Welders: AWS qualified within previous 12 months.

**64.9 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast structures. Lift structures from designated lifting points.
- C. Do not deliver products until concrete has cured 5 days or attained minimum 75 percent of specified 28 day compressive strength.
- D. Store precast concrete structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- E. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

**PART 65 PRODUCTS****65.1 PRECAST CONCRETE UTILITY STRUCTURES**

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.
- B. Precast Concrete Utility Structures: Reinforced precast concrete.
- C. Foundation Slab: Cast-in-place or Precast concrete of type specified in Section 03 30 00, leveled top surface.

**65.2 CONCRETE MATERIALS**

- A. Cement: ASTM C150, Portland type.
- B. Fine and Coarse Aggregates: ASTM C33, except gradation requirements do not apply.
- C. Water: Clean and not detrimental to concrete.

**65.3 ADMIXTURES**

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.
- B. Air Entrainment: ASTM C260.
- C. Chemical Admixtures: ASTM C494/C494M.

**65.4 CONCRETE REINFORCEMENT**

1. All reinforcement wire mesh and rebar must be in compliance with and installed in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**65.5 FRAMES AND COVERS**

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**65.6 ACCESS HATCHES**

1. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**65.7 ACCESSORIES**

- A. All joint materials, steps, membrane curing compound and other necessary appurtenances must conform with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions.

**65.8 CONCRETE MIX**

- A. Select proportions for normal weight concrete in accordance with ACI 318 and ACI 211.1.
- B. Provide concrete to the following criteria:
  1. Compressive Strength: 4,000 psi at 28 days.
  2. Water Cement Ratio:
    - a. Concrete Exposed to Freezing and Thawing: Maximum 0.45 percent by mass.
    - b. Watertight Concrete Not Exposed to Freezing and Thawing: Maximum 0.45 percent by mass.
    - c. Concrete Exposed to Corrosive Conditions: 0.40 percent by mass.
  3. Air Content:

Maximum Aggregate Size inches	Air Content, Percent	
	Severe Exposure	Moderate Exposure
3/8 inches	6.0 to 9.0	4.5 to 7.5
1/2 inches	5.5 to 8.5	4.7 to 7.0
3/4 inches	4.5 to 7.5	3.5 to 6.5

1 inches	4.5 to 7.5	3.0 to 6.0
1-1/2 inches	4.5 to 7.0	3.0 to 6.0

- C. Admixtures: Include admixture types and quantities indicated in concrete mix designs approved through submittal process.
  - 1. Do not use calcium chloride.

## 65.9 FABRICATION

- A. Fabricate precast concrete utility structures in accordance with ACI 318 and NPCA Quality Control Manual for Precast Plants.
- B. Fabricate precast concrete utility structures to size, configuration and openings as indicated on Drawings.
- C. Construct forms to provide uniform precast concrete units with consistent dimensions.
- D. Clean forms after each use.
- E. Install reinforcing by tying or welding to form rigid assemblies. Position reinforcing to maintain minimum 1/2-inch cover. Secure reinforcement to prevent displacement when placing concrete.
- F. Position and secure embedded items to prevent displacement when placing concrete.
- G. Deposit concrete in forms. Consolidate concrete without segregating aggregate.
- H. Provide initial curing by retaining moisture using one of the following methods:
  - 1. Cover with polyethylene sheets.
  - 2. Cover with burlap or other absorptive material and keep continually moist.
  - 3. Apply curing compound in accordance with manufacturer's instructions.
- I. Provide final curing in accordance with manufacturer's standard.
- J. Remove forms without damaging concrete.

## 65.10 CONCRETE FINISHES

- A. Formed Surfaces Not Exposed to View: As formed.
- B. Unformed Surfaces: Finish with vibrating screed or hand float.
  - 1. Permitted: Color variations, minor indentations, chips, and spalls.
  - 2. Not Permitted: Major imperfections, honeycomb, or other defects.

## 65.11 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Perform the following tests for each 150 cy of concrete placed, with minimum one set of tests each week.

1. Slump: ASTM C143/C143M.
  2. Compressive Strength: [[ASTM C31/C31M] [ASTM C192/C192M]] and ASTM C39/C39M.
  3. Air Content: ASTM C231 or ASTM C173.
  4. Unit Weight: ASTM C138.
- C. Visually inspect completed precast structures for defects.
1. Repair defects affecting exposed to view surfaces to achieve uniform appearance.
  2. Repair honeycomb by removing loose material and applying grout to produce smooth surface flush with adjacent surface.
  3. Repair major defects only when permitted by Architect.
- D. Make test results available to Architect Engineer upon request.

## **65.12 FINISHING - STEEL**

- A. Galvanizing: ASTM A123/A123M; minimum 2.0 oz/sq ft coating thickness; galvanize after fabrication.

## **PART 66 EXECUTION**

### **66.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify items provided by other sections of Work are properly sized and located.
- C. Verify correct size and elevation of excavation.
- D. Verify subgrade [and bedding] is properly prepared, [compacted] and ready to receive Work of this section.

### **66.2 PREPARATION**

- A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.
- B. Do not install structures where site conditions induce loads exceeding structural capacity of structures.
- C. Inspect precast concrete structures immediately prior to placement in excavation to verify are internally clean and free from damage. Remove and replace damaged units.

### **66.3 INSTALLATION**

- A. Install underground precast utility structures in accordance with ASTM C891.
- B. Lift precast concrete structures at lifting points designated by manufacturer.
- C. When lowering structures into excavations and joining pipe to units, take precautions to ensure interior of pipeline and structure remains clean.

- D. Install cast-in-place concrete foundation slab in accordance with Section 03 30 00, trowel top surface level.
- E. Install precast concrete utility structures to elevation and alignment indicated on Drawings.
- F. Assemble multi-section structures by lowering each section into excavation.
  - 1. Clean joint surfaces.
  - 2. Install watertight joint seals in accordance with manufacturer's instructions.
- G. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe. Fill annular space with grout.
- H. Connect pipe to structure and seal watertight. Cut pipe flush with interior of structure.
- I. Grout base to achieve slope to exit piping. Trowel smooth. Contour as indicated on Drawings.
- J. Paint interior with 2 coats of bituminous interior coating at rate of 120 square feet per gallon for each coat.
- K. Set frame and cover and access hatch level without tipping, to elevations indicated on Drawings.
  - 1. Set cover and access hatch 2 inches above finished grade for structures located within unpaved areas to allow area to be graded away from cover beginning 1-inch below top surface of frame.
  - 2. Connect drain from access hatch frame to storm drainage system.
- L. Touch up damaged galvanized coatings.  
  
Backfill excavations for structures in accordance with Section 31 23 23.
- M. Install Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications* and *Roadway English Standard Drawings*, latest editions

#### **66.4 FIELD QUALITY CONTROL**

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.

#### **66.5 PERFORM EXFILTRATION TEST IN ACCORDANCE WITH SECTION 33 01 32.**

**END OF SECTION**



## SECTION 33 05 17

### PRECAST CONCRETE VALVE VAULTS AND METER BOXES

#### PART 67 GENERAL

##### 67.1 SUMMARY

- A. Section Includes:
  - 1. Precast concrete valve vaults.
  - 2. Precast concrete meter boxes.
- B. Related Sections:
  - 1. Section 31 05 16 - Aggregates for Earthwork.
  - 2. Section 33 11 16 - Site Water Utility Distribution Piping.

##### 67.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Precast Concrete Valve Vaults:
  - 1. Basis of Measurement: Each.
  - 2. Basis of Payment: Includes excavation, valve vault, accessories, tests, and backfill.
- B. Precast Concrete Meter Boxes:
  - 1. Basis of Measurement: Each.
  - 2. Basis of Payment: Includes excavation, meter box, accessories, test and backfill.

##### 67.3 REFERENCES

- A. ASTM International:
  - 1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
  - 2. ASTM A185 - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
  - 3. ASTM A536 - Standard Specification for Ductile Iron Castings.
  - 4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 5. ASTM C33 - Standard Specification for Concrete Aggregates.
  - 6. ASTM C150 - Standard Specification for Portland Cement.
  - 7. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
  - 8. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 9. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
  - 10. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
  - 11. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.

12. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
13. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joints Sealants.
14. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
15. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
16. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
17. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
18. ASTM D4104 - Standard Test Method (Analytical Procedure) for Determining Transmissivity of Nonleaky Confined Aquifers by Overdamped Well Response to Instantaneous Change in Head (Slug Test)

#### 67.4 DESIGN REQUIREMENTS

- A. Design Criteria:
  1. Watertight precast reinforced air-entrained concrete structures designed to ASTM C890 live loading and installation conditions, and manufactured to conform to ASTM C913.
  2. Minimum 28-day Compressive Strength: 5,000 psi.
  3. Honeycombed or retempered concrete is not permitted.

#### 67.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawing: Indicate plan, location and inverts of connecting piping.
- C. Product Data: Submit data on valve vaults and meter boxes.
- D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from materials suppliers attesting that precast concrete valve vaults and meter boxes provided meet or exceed ASTM Standards and specification requirements.
- E. Manufacturer's Installation Instructions: Submit special procedures for precast concrete valve vaults and meter boxes installation.

#### 67.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products

#### **67.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations and inverts of buried pipe, components and connections.

#### **67.8 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
    - a. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
  - B. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.

#### **67.9 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation Meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### **67.10 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Transport and handle precast concrete units with equipment designed to protect units from damage.
- C. Do not place concrete units in position to cause overstress, warp or twist.

#### **67.11 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

#### **67.12 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

- B. Coordinate work with Local government's utilities within construction area.

## **PART 68 PRODUCTS**

### **68.1 PRECAST CONCRETE VALVES AND METER BOXES**

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.
- B. Materials:
  - 1. Portland Cement: ASTM C150, Type II.
  - 2. Coarse Aggregates: ASTM C33; Graded 1 inch to No. 4 Sieve.
  - 3. Sand: ASTM C33; 2.35 fineness modulus.
  - 4. Water: Potable; clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.
  - 5. Air-Entraining Admixtures: ASTM C260.
  - 6. Reinforcing Steel:
    - a. Deformed Bars: ASTM A615/A615M, Grade 40.
    - b. Welded Wire Fabric: ASTM A185.
  - 7. Joint Sealant:
    - a. ASTM C990.
- C. Mixes:
  - 1. Design concrete mix to produce required concrete strength, air-entrainment, watertight properties, and loading requirements.
- D. Valve Vault and Meter Box Frames and Covers:
  - 1. Cast Iron Castings: ASTM A48/A48M, Class 30 or better; free of bubbles, sand and air holes, and other imperfections.
  - 2. Ductile Iron Castings: ASTM A536.
  - 3. Contact surfaces machined and matched.
  - 4. Cast cover inscription with pipeline service [and Owner's name].
- E. Access Steps:
  - 1. Steel reinforced copolymer polypropylene meeting the following specifications:
    - a. ASTM C478, Section 13.
    - b. ASTM C497, Method of test.
    - c. ASTM D4104, PP0344B33534Z02 copolymer polypropylene.
    - d. ASTM A615/A615M, Grade 60, 1/2" reinforced rod.
  - 2. Aluminum: ASTM B221, Alloy 6061-T6.

### **68.2 BEDDING MATERIALS**

- A. Aggregate Bedding Material: As specified in Section 31 05 16.

**68.3 FABRICATION AND MANUFACTURE**

- A. Fabricate precast reinforced concrete structures in accordance with ASTM C913, to dimensions indicated on Drawings, and to specified design criteria.

**PART 69 EXECUTION****69.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping connection, size, location and inverts are as indicated on Drawings.

**69.2 PREPARATION**

- A. Ream pipe ends and remove burrs.
- B. Remove scale and dirt from components before assembly.
- C. Establish invert elevations for each component in system.
- D. Hand trim excavation to suit valve vaults and meter boxes. Remove stones, roots or other obstructions.

**69.3 TANK AND TANK BEDDING**

- A. Install Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.

**69.4 CONNECTING PIPING**

- A. Connect piping.

**69.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection by Engineer prior to placing aggregate cover over piping.
- C. Compaction Testing: In accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**69.6 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

**END OF SECTION**

## SECTION 33 12 00

### WATER UTILITY DISTRIBUTION EQUIPMENT

#### PART 70 GENERAL

##### 70.1 SUMMARY

- A. Section Includes:
1. Reduced pressure backflow preventer assemblies.
  2. Double check valve backflow preventer assemblies.
  3. Valve vaults.
  4. Buried piping [within 5 feet of backflow preventer valve vault].
  5. Interior piping.
  6. Valves.
  7. Pipe supports.
  8. Bedding and cover materials.
- B. Related Sections:
1. Section 09 90 00 - Painting and Coating: Painting pipes, valves, and associated items.
  2. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
  3. Section 31 05 13 - Soils for Earthwork: Subsoil for backfill.
  4. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill.
  5. Section 31 23 16 - Excavation: Excavating for backflow preventer assemblies.
  6. Section 31 23 17 - Trenching: Trenching for buried pipe installation.
  7. Section 31 23 23 - Fill: Backfilling after backflow preventer assembly installation.
  8. Section 33 05 17 - Precast Concrete Valve Vaults and Meter Boxes: Backflow preventer precast concrete valve vault.
  9. Section 33 11 13 - Public Water Utility Distribution Piping: Potable water piping beyond backflow preventer valve vault.
  10. Section 33 11 16 - Site Water Utility Distribution Piping: Domestic water piping beyond backflow preventer valve vault.
  11. Section 33 13 00 - Disinfecting of Water Utility Distribution: Disinfection of domestic water piping beyond backflow preventer valve vault.

##### 70.2 REFERENCES

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

1. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.
  2. ASSE 1015 - Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies.
  3. ASSE 1047 - Reduced Pressure Detector Fire Protection Backflow Prevention Assemblies.
  4. ASSE 1048 - Double Check Detector Fire Protection Backflow Prevention Assemblies.
- C. ASTM International:
1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  2. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  3. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  4. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  5. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  6. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
  7. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- D. American Water Works Association:
1. AWWA C104 - American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
  2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
  3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
  4. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
  5. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
  6. AWWA C510 - Double Check Valve Backflow Prevention Assembly.
  7. AWWA C511 - Reduced-Pressure Principle Backflow Prevention Assembly.
  8. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
  9. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
- E. American Welding Society:
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
- F. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

### 70.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
1. Submit data on backflow preventer assemblies.



2. Piping: Submit data on pipe materials, fittings, and accessories.
  3. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
  4. Supports: Submit manufacturers catalog information including load capacity.
- C. Manufacturer's Installation Instructions: Submit installation instructions for backflow preventer assemblies, valves, and accessories.
- D. Manufacturer's Certificate: Certify [products] [\_\_\_\_\_] meet or exceed [specified requirements] [\_\_\_\_\_].

#### **70.4 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### **70.5 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of backflow preventer assemblies.
- C. Operation and Maintenance Data: Submit spare parts list, exploded assembly views, and recommended maintenance intervals.

#### **70.6 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
1. Recycled Content Materials: Furnish materials with recycled content.
  2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions..

**70.7 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

**70.8 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

**70.9 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept backflow preventer assemblies, valves, and equipment on site in shipping containers with labeling in place. Inspect for damage.
- C. Furnish cast iron and steel valves with temporary protective coating.
- D. Furnish pipe and fittings with temporary end caps and closures. Maintain caps and closure in place until installation.
- E. Protect backflow preventer assemblies from entry of foreign materials by temporary covers.
  - 1. Protect openings in sections of completed piping systems.
  - 2. Protect openings in piping systems when Work is not in progress.

**70.10 FIELD MEASUREMENTS**

- A. Verify field measurements prior to fabrication.

**70.11 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five year manufacturer's warranty for backflow preventer assemblies.

**70.12 EXTRA MATERIALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for extra materials.
- B. Furnish two sets of seals for each backflow preventer assembly.

### 71.1 BACKFLOW PREVENTERS (BFP)

- A. Furnish materials in accordance with the NCDOT *Standard Specifications for Roads and Structures* and its subsequent revisions & additions entitled, *Supplemental Specifications and Roadway English Standard Drawings*, latest editions. Any of the following may be required per Drawings. Reference Construction Drawings or contact Engineer if type of BFP is not specified.
- B. Reduced Pressure Backflow Preventers:
1. Size: 3/4 inch to 2 inches.
  2. Comply with ASSE 1013 and AWWA C511.
  3. Bronze body, with bronze internal parts and stainless steel springs.
  4. Two independently operating, spring loaded check valves.
  5. Diaphragm type differential pressure relief valve located between check valves.
  6. Third check valve opening under back pressure in case of diaphragm failure.
  7. Furnish with two quarter-turn, full port resilient seated bronze, ball valves, strainer, and test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

- C. Reduced Pressure Backflow Preventers with Detector Assembly:
1. Size: 3/4 inch to 2 inches.
  2. Comply with ASSE 1047 and AWWA C511.
  3. Bronze body, with bronze internal parts and stainless steel springs.
  4. Two independently operating, spring loaded check valves.
  5. Diaphragm type differential pressure relief valve located between check valves.
  6. Third check valve opening under back pressure in case of diaphragm failure.
  7. Furnish with two quarter-turn, full port resilient seated bronze, ball valves, strainer, and test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

- D. Reduced Pressure Backflow Preventers:
1. Size: 3 inches to 10 inches.
  2. Comply with ASSE 1013 and AWWA C511.
  3. Heavy duty cast iron construction with fusion epoxy coat inside and outside.
  4. Two independently operating, spring loaded check valves.
  5. Diaphragm type differential pressure relief valve located between check valves.
  6. Third check valve opening under back pressure in case of diaphragm failure.
  7. Furnish with two resilient seated gate valves [NRS or OS&Y], strainer, and four resilient seated, ball valve test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

- E. Reduced Pressure Backflow Preventers with Detector Assembly:
1. Size: 3 inches to 10 inches.
  2. Comply with ASSE 1047 and AWWA C511.
  3. Heavy duty cast iron construction with fusion epoxy coat inside and outside.
  4. Two independently operating, spring loaded check valves.

5. Diaphragm type differential pressure relief valve located between check valves.
6. Third check valve opening under back pressure in case of diaphragm failure.
7. Furnish with two resilient seated gate valves [NRS or OS&Y], strainer, and four resilient seated, ball valve test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

F. Double Check Valve Backflow Preventer Assemblies:

1. Size: 1/2 inch to three inches.
2. Comply with ASSE 1015 and AWWA C510.
3. Bronze body with corrosion resistant internal parts.
4. Stainless steel springs.
5. Two independently operating check valves with intermediate atmospheric vent.
6. Furnish with two quarter-turn, full port resilient seated, bronze ball valves, strainer, and test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

G. Double Check Valve Backflow Preventer with Detector Assembly:

1. Size: 1/2 inch to three inches.
2. Comply with ASSE 1048 and AWWA C510.
3. Bronze body with corrosion resistant internal parts.
4. Stainless steel springs.
5. Two independently operating check valves with intermediate atmospheric vent.
6. Furnish with two quarter-turn, full port resilient seated, bronze ball valves, strainer, and test cocks.

\*\*\*\*\* [OR] \*\*\*\*\*

H. Double Check Valve Backflow Preventer Assemblies:

1. Size: 2-1/2 inches to 10 inches.
2. Comply with ASSE 1015 and AWWA C510.
3. Heavy duty cast iron construction with fusion epoxy coat inside and outside.
4. Stainless steel springs.
5. Two independently operating check valves.
6. Furnish with two resilient seated, flanged, gate valves [NRS or OS&Y], and strainer.

\*\*\*\*\* [OR] \*\*\*\*\*

I. Double Check Valve Backflow Preventer with Detector Assembly:

1. Size: 2-1/2 inches to 10 inches.
2. Comply with ASSE 1048 and AWWA C510.
3. Heavy duty cast iron construction with fusion epoxy coat inside and outside.
4. Stainless steel springs.
5. Two independently operating check valves.
6. Furnish with two resilient seated, flanged, gate valves [NRS or OS&Y], and strainer.

\*\*\*\*\* [OR] \*\*\*\*\*

- J. Double Check Valve Backflow Preventer Assemblies:
1. Size: 4 inches to 12 inches.
  2. Comply with ASSE 1015 and AWWA C510.
  3. Main valve body and internal metal parts stainless steel series 300.
  4. Two independently operating stainless steel check valves.
  5. Furnish with two resilient seated, flanged, stainless steel gate valves [NRS or OS&Y], and cast iron strainer.

\*\*\*\*\* [OR] \*\*\*\*\*

- K. Double Check Valve Backflow Preventer with Detector Assembly:
1. Size: 4 inches to 12 inches.
  2. Comply with ASSE 1048 and AWWA C510.
  3. Main valve body and internal metal parts stainless steel series 300.
  4. Two independently operating stainless steel check valves.
  5. Furnish with two resilient seated, flanged, stainless steel gate valves [NRS or OS&Y], and cast iron strainer.

## 71.2 VALVE VAULT

- A. Valve Vault: Precast concrete, as specified in Section 33 05 17.

## 71.3 PIPING

- A. Ductile Iron Pipe: [AWWA C151.] [AWWA C104.] [\_\_\_\_\_.]
1. Fittings: [Ductile] [Gray] iron, standard thickness.
  2. Joints: AWWA C111, rubber gasket with rods.
- B. PVC Pipe: [ASTM D1785, Schedule 40] [ASTM D1785, Schedule 80] [ASTM D2241, [SDR-26 for 160 psig pressure rating] [SDR-41 for 100 psig rating] [SDR-21 for 200 psig rating]]:
1. Fittings: ASTM D2466, PVC.
  2. Joints: ASTM D2855, solvent weld.
- C. PVC Pipe: AWWA C900 Class [100] [150]:
1. Fittings: AWWA C111, cast iron.
  2. Joints: ASTM D3139 compression gasket ring.

## 71.4 PIPE SUPPORTS

- A. Furnish materials in accordance with the Standards of the Local government and that of the AWWA.
- B. Floor Support for Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
- C. Copper Pipe Support : Carbon steel ring, adjustable, copper plate.

## 71.5 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 05 16.

- B. Cover: As specified in Section 31 05 16.
- C. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 05 13.  
Subsoil must contain no rocks over 6 inches in diameter, frozen earth or foreign matter.

## 71.6 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 3 inches and Smaller:
  - 1. Ferrous pipe: Class 150 malleable iron threaded unions.
  - 2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Pipe Size 1 inch and Larger:
  - 1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
  - 2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings:
  - 1. Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
  - 2. Sealing gasket: "C" shape composition sealing- gasket.
- D. PVC Pipe:
  - 1. For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions, or Schedule 80 threaded PVC pipe.
- E. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

## 71.7 ACCESSORIES

- A. Underground Pipe Markers: Trace wire.

## PART 72 EXECUTION

### 72.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify excavations are to required grade, dry, and not over-excavate.
- C. Verify piping connection, size, location and inverts are as indicated on Drawings.

### 72.2 PREPARATION

- A. Remove scale and dirt, on inside and outside, before assembly.

**72.3 INSTALLATION - VALVE VAULT**

- A. Refer to Section 33 05 17.

**72.4 INSTALLATION - PIPE SUPPORTS**

- A. Pipe Supports:
  - 1. Install pipe supports in accordance with MSS SP 89.
  - 2. Prime coat exposed supports. [Refer to Section 09 90 00.]

**72.5 INSTALLATION - BURIED PIPING SYSTEMS**

- A. Verify connection to existing piping system (size, location, and invert) is as indicated on Drawings.
- B. Establish elevations of buried piping with not less than 3-feet of cover.
- C. Establish minimum 1.5-foot separation from other piping in accordance with NC and Local government code.
- D. Remove scale and dirt on inside of piping before assembly.
- E. Excavate pipe trench in accordance with Section 31 23 17.
- F. Install pipe to appropriate elevation relative to existing ground, existing tap elevation and depth & location of other service piping.
- G. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4-inches depth; compact to 95 percent maximum density.
- H. Install pipe on prepared bedding.
- I. Route pipe in straight line, allowing for expansion and contraction without stress.
- J. Install shutoff and drain valves at locations indicated on Drawings in accordance with this Section.
- K. Install trace wire continuous over top of pipe. buried 6 inches below finish grade,]above pipe line; coordinate with Section 31 23 23 and Section 31 23 17. Refer to Section 22 05 53.
- L. Pipe Cover and Backfilling:
  - 1. Backfill trench in accordance with Section 31 23 23.
  - 2. Maintain optimum moisture content of fill material to attain required compaction density.
  - 3. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 4- inches compacted layers to 12-inches minimum cover over top of pipe. Compact to 95 percent maximum density.
  - 4. Evenly and continuously backfill remaining trench depth in uniform layers.

- M. Do not use wheeled or tracked vehicles for tamping.

**72.6 INSTALLATION - INTERIOR PIPING SYSTEMS**

- A. Install Work in accordance with Local government Standards.

**72.7 INSTALLATION - BACKFLOW PREVENTER ASSEMBLIES**

- A. Install Work in accordance with Local government Standards.

**72.8 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on backflow pressure assemblies installation with Section 33 11 16.

**72.9 CLEANING**

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Disinfect backflow preventer assemblies installation in accordance with Section 33 13 00.

**END OF SECTION**



## SECTION 33 12 13

### WATER SERVICE CONNECTIONS

#### PART 73 GENERAL

##### 73.1 SUMMARY

- A. Section Includes:
1. Pipe and fittings for domestic water service connections to buildings.
  2. Corporation stop assembly.
  3. Curb stop assembly.
  4. Meter setting equipment.
  5. Water meters.
  6. Backflow preventers.
  7. Underground pipe markers.
  8. Precast concrete vault.
  9. Bedding and cover materials.
- B. Related Sections:
1. Section 03 30 00 - Cast-In-Place Concrete.
  2. Section 22 05 23 - General-Duty Valves for Plumbing Piping.
  3. Section 22 11 00 - Facility Water Distribution.
  4. Section 31 05 13 - Soils for Earthwork.
  5. Section 31 05 16 - Aggregates for Earthwork.
  6. Section 31 23 16 - Excavation.
  7. Section 31 23 17 - Trenching.
  8. Section 31 23 23 - Fill.
  9. Section 33 05 13 - Manholes and Structures.
  10. Section 33 13 00 - Disinfecting of Water Utility Distribution

##### 73.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe and Fittings:
1. Basis of Measurement: By linear foot. Basis of Payment: Includes hand trimming excavation, pipe and fittings, bedding, concrete thrust restraints, connection to building service piping, and to municipal utility water source.
- B. Corporation Stop Assembly:
1. Basis of Measurement: By the unit.
  2. Basis of Payment: Includes corporation stop, fittings and accessories.
- C. Curb Stop Assembly:
1. Basis of Measurement: By the unit.
  2. Basis of Payment: Includes curb stop, curb box and cover, fittings, and accessories.

- D. Water Meters:
  1. Basis of Measurement: By the unit.
  2. Basis of Payment: Includes meter, meter setting equipment, fittings and accessories.
  
- E. Backflow Preventers:
  1. Basis of Measurement: By the unit.
  2. Basis of Payment: Includes backflow preventer, fittings and accessories.

### 73.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. American Society of Mechanical Engineers:
  1. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
  2. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
  
- C. American Society of Sanitary Engineering:
  1. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent.
  2. ASSE 1013 - Reduced Pressure Principle Backflow Preventers.
  
- D. ASTM International:
  1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
  2. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.
  3. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
  4. ASTM C858 - Standard Specification for Underground Precast Concrete Utility Structures.
  5. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  6. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  7. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  8. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
  9. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
  10. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  11. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  12. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  
- E. American Welding Society:
  1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

- F. American Water Works Association:
  - 1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
  - 2. AWWA C700 - Cold-Water Meters - Displacement Type, Bronze Main Case.
  - 3. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
  - 4. AWWA C702 - Cold-Water Meters - Compound Type.
  - 5. AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.
  - 6. AWWA C800 - Underground Service Line Valves and Fittings.
  - 7. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. through 3 in., for Water Service.
  - 8. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

#### **73.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Provide shop drawings for precast concrete vaults to include detail drawings showing the vault and accessories.
- C. Product Data: Submit data on pipe materials, pipe fittings, corporation stop assemblies, curb stop assemblies, meters, meter setting equipment, service saddles, backflow preventer, and accessories.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### **73.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### **73.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, curb stops, connections, thrust restraints, and invert elevations.

- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### 73.7 QUALITY ASSURANCE

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content [including:] [.]
    - a. Regional Materials: Furnish materials extracted, processed, and manufactured within 500
- B. Perform Work in accordance with Local government Standards, latest edition.

### 73.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. During loading, transporting, and unloading of materials and products, exercise care to prevent any damage.
- C. Store products and materials off ground and under protective coverings and custody, away from walls and in manner to keep these clean and in good condition until used.
- D. Exercise care in handling precast concrete products to avoid chipping, cracking, and breakage.

## PART 74 PRODUCTS

### 74.1 WATER PIPING AND FITTINGS

- A. Copper Tubing: ASTM B88, Type [K,] [L,] annealed:
  - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
  - 2. Joints: Compression connection or AWS A5.8, BCuP silver braze.

\*\*\*\*\* [OR] \*\*\*\*\*
- B. PVC Pipe: [ASTM D1785, Schedule 40] [ASTM D1785, Schedule 80] [ASTM D2241, [SDR-26 for 160 psig pressure rating] [SDR-41 for 100 psig rating] [SDR-21 for 200 psig rating]]:
  - 1. Fittings: ASTM D2466, PVC.
  - 2. Joints: ASTM D2855, solvent weld.

\*\*\*\*\* [OR] \*\*\*\*\*
- C. Polyethylene Pipe: [AWWA C901] [ASTM D3035, for [45] [60] [80] [100] [130] [145] [160] psig pressure rating]:
  - 1. Fittings: AWWA C901, molded [or fabricated].
  - 2. Joints: [Compression] [Butt fusion].

**74.2 CORPORATION STOP ASSEMBLY**

- A. Furnish materials in accordance with Local government Standards.
- B. Corporation Stops:
  - 1. Brass or red brass alloy body conforming to ASTM B62.
  - 2. Inlet end threaded for tapping according to AWWA C800.
  - 3. Outlet end suitable for service pipe specified.
- C. Service Saddles:
  - 1. Double strap type, designed to hold pressures in excess pipe working pressure.

**74.3 CURB STOP ASSEMBLY**

- A. Furnish materials in accordance with Local government Standards.
- B. Curb Stops:
  - 1. Brass or red brass alloy body conforming to ASTM B62.
  - 2. Plug type valve.
  - 3. Positive pressure sealing.
- C. Curb Boxes and Covers:
  - 1. Cast iron body, Extension Type or Buffalo Type.
  - 2. Minneapolis or Arch Pattern Base.
  - 3. Lid with inscription WATER, with Pentagon Plug.

**74.4 METER SETTING EQUIPMENT**

- A. Furnish materials in accordance with Local government Standards.
- B. Outside Meter Setting:
  - 1. Meter Yokes: Copper or iron, riser type assembly with bronze inlet inverted key angle valve expansion type outlet connection and Ell fitting; flared copper tubing connections both ends.
  - 2. Meter Yokes: Copper or iron, inlet and outlet horizontal or vertical setting with matching couplings, fittings and stops.

**74.5 WATER METERS**

- A. Furnish materials in accordance with Local government Standards.
- B. AWWA C700, AWWA C701 & AWWA C702, positive displacement disc type suitable for fluid with bronze case and cast iron [frost-proof, breakaway] bottom cap, hermetically sealed register (remote reading to AWWA C706).
- C. Meter: Brass body turbine meter with magnetic drive register.

**74.6 BACKFLOW PREVENTERS**

- A. Furnish materials in accordance with Local government Standards.

- B. Reduced Pressure Backflow Preventers:
  - 1. Comply with ASSE 1013.
  - 2. Bronze body, with bronze internal parts and stainless steel springs.
  - 3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.
- C. Double Check Valve Assemblies: Comply with ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

#### **74.7 UNDERGROUND PIPE MARKERS**

- A. Furnish materials in accordance with Local government Standards.
- B. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Water".

#### **74.8 PRECAST CONCRETE VAULT**

- A. Furnish materials in accordance with Local government Standards.
- B. Product Description: Precast vault designed in accordance with ASTM C858, comprising modular, interlocking sections complete with accessories.

#### **74.9 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 31 05 16.
- B. Cover: As specified in Section [31 05 16] [\_\_\_\_\_].
- C. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 05 13. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

#### **74.10 ACCESSORIES**

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.
- B. Manhole and Cover: Refer to Section 33 05 13.

### **PART 75 EXECUTION**

#### **75.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify building service connection and municipal utility water main size, location, and invert are as indicated on Drawings.

**75.2 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

**75.3 INSTALLATION - CORPORATION STOP ASSEMBLY**

- A. Make connection for each different kind of water main using suitable materials, equipment and methods approved by the Architect/Engineer.
- B. Provide service clamps for mains other than of cast iron or ductile iron mains.
- C. Screw corporation stops directly into tapped and threaded iron main at 10 and 2 o'clock position on main's circumference; locate corporation stops at least 12 inches apart longitudinally and staggered.
- D. For plastic pipe water mains, provide full support for service clamp for full circumference of pipe, with minimum 2 inches width of bearing area; exercise care against crushing or causing other damage to water mains at time of tapping or installing service clamp or corporation stop.
- E. Use proper seals or other devices so no leaks are left in water mains at points of tapping; do not backfill and cover service connection until approved by the Architect/Engineer.

**75.4 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 17 for Work of this Section.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6- inches compacted depth; compact to 95 percent.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent.
- D. Maintain optimum moisture content of fill material to attain required compaction density.

**75.5 INSTALLATION - PIPE AND FITTINGS**

- A. Maintain separation of water main from sewer piping in accordance with NC and Local government code.
- B. Group piping with other site piping work whenever practical.
- C. Install pipe to indicated elevation to within tolerance of 5/8 inches.
- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Install access fittings to permit disinfection of water system performed under Section 33 13 00.

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- F. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.
- G. Establish elevations of buried piping with not less than 3 ft of cover.
- H. Install trace wire continuous over top of pipe buried 6 inches below finish grade, above pipe line; coordinate with Section 31 23 23.
- I. Backfill trench in accordance with Section 31 23 23.
- J. Install Work in accordance with Local government Standards.

**75.6 INSTALLATION - CURB STOP ASSEMBLY**

- A. Set curb stops on compacted soil.
- B. Install Work in accordance with Local government Standards.

**75.7 INSTALLATION - WATER METERS**

- A. Install Work in accordance with Local government Standards.

**75.8 INSTALLATION - BACKFLOW PREVENTERS**

- A. Install backflow preventer where indicated on the Contract Drawings and in accordance with manufacturer's instructions.
- B. Comply with local water company requirements and plumbing codes in regards to testing and installation requirements.

**75.9 SERVICE CONNECTIONS**

- A. Install Work in accordance with Local government Standards.

**75.10 PRECAST CONCRETE VAULT**

- A. Construct valve vaults of precast concrete.
- B. Seal vault joints watertight with preformed plastic joint sealant compound. Apply asphalt waterproofing to exterior walls.
- C. Seal annular space between pipe and wall sleeves as indicated on the Contract Drawings.
- D. Install vault covers and frames; adjust to finished grade elevation.

**75.11 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Flush and disinfect system in accordance with Section 33 13 00.



**75.12 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.
- C. Compaction Testing for Bedding: In accordance with ASTM D1557.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**END OF SECTION**



## SECTION 33 12 16

### WATER UTILITY DISTRIBUTION VALVES

#### PART 76 GENERAL

##### 76.1 SUMMARY

- A. Section Includes:
  - 1. Valves.
  - 2. Valve boxes.
  
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 31 05 16 - Aggregates for Earthwork.
  - 3. Section 31 23 16 - Excavation.
  - 4. Section 31 23 23 - Fill.
  - 5. Section 33 11 16 - Site Water Utility Distribution Piping.
  - 6. Section 33 12 13 - Water Service Connections.
  - 7. Section 33 12 19 - Water Utility Distribution Fire Hydrants.
  - 8. Section 33 13 00 - Disinfecting of Water Utility Distribution.

##### 76.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Valves:
  - 1. Basis of Measurement: Each.
  - 2. Basis of Payment: Includes excavation, valve, valve box, accessories, tests, and backfill.

##### 76.3 REFERENCES

- A. American Water Works Association:
  - 1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
  - 2. AWWA C509 - Resilient-Seated Gate Valves for Water-Supply Service.
  - 3. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
  - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
  
- B. National Sanitation Foundation:
  - 1. NSF 61 - Drinking Water System Components - Health Effects

##### 76.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
  
- B. Shop Drawing:
  - 1. Installation Plan: Submit description of proposed installation.

- C. Design Data: Submit manufacturer's latest published literature include illustrations, installation instructions, maintenance instructions and parts lists.
- D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that valves and accessories provided meet or exceed AWWA Standards and specification requirements.

#### **76.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

#### **76.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of valves.
- C. Provide Operation and Maintenance Data for valves.

#### **76.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform work in accordance with North Carolina Public Water Supply and the Local Government Standards.

#### **76.8 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 3 years documented experience approved by manufacturer.

#### **76.9 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation Meeting.

- B. Convene minimum one week prior to commencing work of this section.

**76.10 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Prepare valves and accessories for shipment according to AWWA Standards and seal valve and ends to prevent entry of foreign matter into product body.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

**76.11 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

**76.12 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with the Local Government.
- C.

**76.13 MAINTENANCE MATERIALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Furnish one tee wrench to Owner; required length.

**PART 77 PRODUCTS**

**77.1 DOUBLE-DISC GATE VALVES**

- A. Manufacturers:
  - 1. Mueller Company
  - 2. Clow Eddy - Iowa
  - 3. American Flow Control
  - 4. Substitutions: Per Local Government

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Furnish materials in accordance with Public Water Supply and Local Government Standards.
- C. Double-Disc Gate Valves: AWWA C500, NSF 61; iron body, bronze trim.
  - 1. Gate: Double disc parallel seat gate.
  - 2. Stem: Non-rising stem.
  - 3. Seals: O-ring stem seals.
  - 4. Operating Nut: Square; open counterclockwise unless otherwise indicated.
  - 5. Ends: Flanged, mechanical joint or bell end connections.
  - 6. Coating: AWWA C550; interior and exterior.
  - 7. Provide valves 16 inch diameter and larger with bypass valves and gear operators.
  - 8. Sizes 12 inches diameter and smaller: 200 psig.
  - 9. Sizes 14 inches diameter and larger: 150 psig.

## 77.2 RESILIENT WEDGE GATE VALVES

- A. Manufacturers:
  - 1. Mueller Company
  - 2. Clow Eddy - Iowa
  - 3. American Flow Control
  - 4. Substitutions: Per Local Government.

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Furnish materials in accordance with Public Water Supply and Local Government Standards.
- C. Resilient Wedge Gate Valves: AWWA C509; iron body, bronze or ductile iron.
  - 1. Resilient seats.
  - 2. Stem: Non-rising bronze stem.
  - 3. Operating Nut: Square; open counterclockwise unless otherwise indicated.
  - 4. Ends: Flanged, mechanical joint or bell end connections.
  - 5. Coating: AWWA C550; interior/exterior.
  - 6. Sizes 12 inch diameter and smaller: 200 psig.
  - 7. Sizes 16 inch diameter and larger: 150 psig.

## 77.3 VALVE BOXES

- A. 12 inch diameter Valves and Smaller: Domestic cast iron, two-piece, screw type.
- B. Valves Larger than 12 inch diameter: Domestic cast iron, three-piece, screw type; round base.
- C. Cast iron lid, marked "Water".

## 77.4 ACCESSORIES

- A. Concrete for Thrust Restraints: 3,000 PSI Concrete @ 28 Days

**78.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of valves from Drawings; obtain clarification and directions from Architect/Engineer prior to execution of work.
- C. Verify invert elevations of existing work prior to excavation and installation of valves.

**78.2 PREPARATION**

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
  - 1. Notify Architect/Engineer not less than 5 days in advance of proposed utility interruption.
  - 2. Do not proceed without written permission from the Architect/Engineer.
- D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 17.

**78.3 INSTALLATION**

- A. Install valves in conjunction with pipe laying; set valves plumb.
- B. Provide buried valves with valve boxes installed flush with finished grade.

\*\*\*\*\* [OR] \*\*\*\*\*

- C. Install Work in accordance with North Carolina Public Water Supply and Local Government Standards.

**78.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Flush and disinfect system in accordance with Section 33 13 00.

**78.5 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.

\*\*\*\*\* [OR] \*\*\*\*\*

- C. Pressure test system to 200 psi. Repair leaks and re-test.
  - 1. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct, in presence of Architect/Engineer, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600.
  - 2. Provide equipment required to perform leakage and hydrostatic pressure tests.
  - 3. Test Pressure: Not less than 200 psi or 50 psi in excess of maximum static pressure, whichever is greater.
  - 4. Conduct hydrostatic test for at least two-hour duration.
  - 5. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, apply test pressure. At conclusion of tests, close resulting piping openings.
  - 6. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.
  - 7. Examine exposed piping, fittings, valves and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves or joints discovered, following pressure test.
  - 8. No pipeline installation will be approved when leakage is greater than that determined by the following formula:

$L = (SD\sqrt{P})/C$
L = allowable, in gallons per hour
S = length of pipe tested, in feet
D = nominal diameter of pipe, in inches
p = average test pressure during leakage test, in pounds per square inch gauge
C = 133,200

- 9. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.

**END OF SECTION**



## SECTION 33 12 19

### WATER UTILITY DISTRIBUTION FIRE HYDRANTS

#### PART 79 GENERAL

##### 79.1 SUMMARY

- A. Section Includes:
  - 1. Fire hydrants.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 33 11 16 - Site Water Utility Distribution Piping.
  - 3. Section 33 12 13 - Water Service Connections.
  - 4. Section 33 12 16 - Water Utility Distribution Valves.
  - 5. Section 33 13 00 - Disinfecting of Water Utility Distribution.

##### 79.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Fire Hydrants:
  - 1. Basis of Measurement: Each.
  - 2. Basis of Payment: Includes excavation, fire hydrant, accessories, test and backfill.

##### 79.3 REFERENCES

- A. American Water Works Association:
  - 1. AWWA C502 - Dry-Barrel Fire Hydrants.
  - 2. AWWA C503 - Wet-Barrel Fire Hydrants.
  - 3. AWWA C550 - Protecting Epoxy Interior Coating for Valves and Hydrants.
  - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
- B. National Sanitation Foundation:
  - 1. NSF 61 - Drinking Water System Components - Health Effects
- C. National Fire Protection Association:
  - 1. NFPA 281 - Recommended Practice for Fire Flow Testing and Marking of Hydrants

##### 79.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawing:
  - 1. Installation Plan: Submit description of proposed installation.

- C. Design Data: Submit manufacturer's latest published literature including illustrations, installation instructions, maintenance instructions and parts lists.
- D. Manufacturer's Certificates: Submit Statement of Compliance, supporting data, from material suppliers attesting that hydrants and accessories provided meet or exceed AWWA Standards and specification requirements.

#### **79.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Local and regional products.

#### **79.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of fire hydrants.
- C. Provide Operation and Maintenance Data for fire hydrants.

#### **79.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with Local government Standards.
- C. Provide uniform color scheme for fire hydrants in accordance with NFPA 281 and Local government Standards.

#### **79.8 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

### **79.9 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation Meeting.
- B. Convene minimum one week prior to commencing work of this section.

### **79.10 DELIVERY, STORAGE AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing and protecting products.
- B. Prepare hydrants and accessories for shipment according to AWWA Standards and seal hydrant and ends to prevent entry of foreign matter into product body.
- C. Store products in areas protected from weather, moisture, or possible damage; do not store products directly on ground; handle products to prevent damage to interior or exterior surfaces.

### **79.11 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and landscape in immediate or adjacent areas.

### **79.12 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with Local government and all entities owning utilities within construction area.

## **PART 80 PRODUCTS**

### **80.1 FIRE HYDRANTS**

- A. Furnish materials in accordance with Local government Standards.
- B. Dry-barrel Break-away Type: AWWA C502; cast-iron body, compression type valve.
  - 1. Bury Depth: As indicated on the Drawings.
  - 2. Inlet Connection: 6 inches.
  - 3. Valve Opening: 5-1/4 inches diameter.
  - 4. Ends: Mechanical Joint or Bell End.
  - 5. Bolts and Nuts: Corrosion resistant.
  - 6. Coating: AWWA C550; interior.
  - 7. Direction of Opening: Counterclockwise unless otherwise indicated.
- C. Wet-Barrel Type: AWWA C503; cast-iron body.

1. Valve Openings: Individual for pumper and hose nozzles.
  2. Ends: Mechanical joint or bell end.
  3. Bolts and Nuts: Corrosion resistant.
  4. Coating: AWWA C550; interior.
- D. One pumper, two hose nozzles.
1. Obtain thread type and size from local fire department.
  2. Attach nozzle caps by separate chains.
- E. Finish: Primer and two coats of enamel and/or Special coating color in accordance with Local government and NFPA 281 requirements.

## **80.2 ACCESSORIES**

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.
- B. Aggregate: Aggregate for hydrant drainage specified in Section 31 05 16.

## **PART 81 EXECUTION**

### **81.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Determine exact location and size of hydrants from Drawings; obtain clarification and directions from Architect/Engineer prior to execution of work.
- C. Verify invert elevations [of existing work] prior to excavation and installation of fire hydrants.

### **81.2 PREPARATION**

- A. Identify required lines, levels, contours and datum locations.
- B. Locate, identify, and protect utilities to remain from damage.
- C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.
1. Notify Architect & Engineer not less than two days in advance of proposed utility interruption.
  2. Do not proceed without written permission from the Architect.
- D. Perform trench excavation, backfilling and compaction in accordance with Section 31 23 17.

### **81.3 INSTALLATION**

- A. Install fire hydrants; provide support blocking and drainage gravel; do not block drain hole.

- B. Set hydrants plumb with pumper nozzle facing roadway; set hydrants with centerline of pumper nozzle 18 inches above finished grade and safety flange not more than 6 inches nor less than 2 inches above grade.
- C. Paint hydrants in accordance with local color scheme.
- D. After hydrostatic testing, flush hydrants and check for proper drainage.

#### **81.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Flush and disinfect system in accordance with Section 33 13 00.

#### **81.5 FIELD QUALITY CONTROL**

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
- B. Perform pressure test on domestic site water distribution system in accordance with AWWA C600.
- C. Perform pressure test on domestic site water distribution system in accordance with Local government Standards.

**END OF SECTION**



## **SECTION 33 13 00**

### **DISINFECTING OF WATER UTILITY DISTRIBUTION**

#### **PART 82 GENERAL**

##### **82.1 SUMMARY**

- A. Section includes disinfection of potable water distribution [and transmission] system; and testing and reporting results.
- B. Related Sections:
  - 1. Section 22 40 00 - Plumbing Fixtures: Disinfection of building domestic water piping system.
  - 2. Section 33 11 16 - Site Water Utility Distribution Piping: Product and Execution requirements for installation, testing, of site domestic water distribution piping.
  - 3. Section 33 21 00 - Water Supply Wells: Product and Execution requirements for installation, testing, and disinfection of water wells.

##### **82.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Disinfection:
  - 1. Basis of Measurement: By the linear foot.
  - 2. Basis of Payment: Includes preparing, disinfecting, testing, and reporting.

##### **82.3 REFERENCES**

- A. American Water Works Association:
  - 1. AWWA B300 - Hypochlorites.
  - 2. AWWA B301 - Liquid Chlorine.
  - 3. AWWA B302 - Ammonium Sulfate.
  - 4. AWWA B303 - Sodium Chlorite.
  - 5. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
  - 6. AWWA C651 - Disinfecting Water Mains.

##### **82.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Test Reports: Indicate results comparative to specified requirements.
- D. Certificate: Certify cleanliness of water distribution system meets or exceeds specified requirements.

**82.5 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Disinfection Report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Name of person collecting samples.
  - 5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
  - 6. Date and time of flushing start and completion.
  - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Coliform bacteria test results for each outlet tested.
  - 7. Certify water conforms, or fails to conform, to bacterial standards of NC Public Water Supply Section and Local government.
- D. Water Quality Certificate: Certify water conforms to quality standards of Local government, suitable for human consumption.

**82.6 QUALITY ASSURANCE**

- A. Perform Work in accordance with AWWA C651 and in accordance with Local government Standards.

**82.7 QUALIFICATIONS**

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years documented experience.
- B. Testing Firm: Company specializing in testing potable water systems, certified and approved by State of North Carolina.
- C. Submit bacteriologist's signature and authority associated with testing.

**PART 83 PRODUCTS****83.1 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Liquid Chlorine, AWWA B302, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.



#### **84.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

#### **84.2 INSTALLATION**

- A. Provide and attach required equipment to perform the Work of this section.
- B. Perform disinfection of water distribution system and installation of system and pressure testing. Refer to Section 33 11 16.
- C. [Inject treatment disinfectant] [Introduce treatment] into piping system.
- D. Maintain disinfectant in system for 24 hours.
- E. Flush, circulate, and clean until required cleanliness is achieved - use domestic water.
- F. Replace permanent system devices removed for disinfection.

#### **84.3 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Disinfection, Flushing, and Sampling:
  - 1. Disinfect pipeline installation in accordance with AWWA C651. Use of liquid chlorine is not permitted
  - 2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
  - 3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
  - 4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

**END OF SECTION**



## SECTION 33 31 00

### SANITARY UTILITY SEWERAGE PIPING

#### PART 85 GENERAL

##### 85.1 SUMMARY

- A. Section Includes:
  - 1. Sanitary sewage pipe.
  - 2. Underground pipe markers.
  - 3. Manholes.
  - 4. Bedding and cover materials.
  
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Concrete type for manhole base pad construction.
  - 2. Section 22 13 00 - Facility Sanitary Sewerage: Product and execution requirements for sanitary waste and vent piping at building.
  - 3. Section 31 05 13 - Soils for Earthwork: Soils for backfill in trenches.
  - 4. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
  - 5. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
  - 6. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
  - 7. Section 31 23 23 - Fill: Requirements for backfill to be placed by this section.

##### 85.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Pipe and Fittings:
  - 1. Basis of Measurement: By the linear foot.
  - 2. Basis of Payment: Includes hand trimming excavation, bedding, pipe and fittings, connection to building service piping and to municipal sewer.
  
- B. Cleanout:
  - 1. Basis of Measurement: By the linear foot for nominal depth of 2 feet.
  - 2. Basis of Payment: Includes hand trimming excavating, foundation pad, unit installation with accessories, connection to sewer piping.

##### 85.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
  - 2. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe.

3. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
4. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
5. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
6. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
7. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3- 8. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3- 9. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- 10. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- 11. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
- 12. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- 13. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
- 14. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 15. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
- 16. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- 17. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- 18. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- 19. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 20. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.</sup></sup>

#### 85.4 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

#### 85.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating pipe material and accessories used.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

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

#### **85.6 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for [salvaged] [and] [reused] products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### **85.7 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

#### **85.8 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content [including:] [.]
- B. Perform Work in accordance with Local government Standards.

#### **85.9 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

#### **85.10 FIELD MEASUREMENTS**

- A. Verify field measurements and elevations are as shown on Drawings.

**85.11 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with termination of sanitary sewer connection outside building, connection to municipal sewer utility service and trenching.

**PART 86 PRODUCTS**

**86.1 SANITARY SEWAGE PIPE**

- A. Ductile Iron Pipe and Polyvinyl Chloride pipe must conform to Local government Standards in construction quality and installation

**86.2 UNDERGROUND PIPE MARKERS**

- A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Sewer" in large letters.

**86.3 MANHOLES**

- A. Manholes to be constructed in accordance with NCDOT and Local government Standards..

**86.4 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 31 05 16.
- B. Cover: As specified in Section 31 05 16.
- C. Soil Backfill from Above Pipe to Finish Grade: Soil, as specified in Section 31 05 13. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

**PART 87 EXECUTION**

**87.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify [trench cut] [excavation base] is ready to receive work and excavations, dimensions, and elevations are as indicated on [layout] drawings.

**87.2 PREPARATION**

- A. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

- A. Excavate pipe trench in accordance with Section 31 23 17.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

**87.4 INSTALLATION - PIPE**

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- B. Lay pipe to slope gradients noted on [layout] drawings; with maximum variation from indicated slope of 1/8-inch in 10 feet.
- C. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.
- D. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.
- E. Connect to building sanitary sewer outlet and municipal sewer system.
- F. Install trace wire continuous over top of pipe buried 6 inches below finish grade, above pipe line; coordinate with Section 31 23 23 and Section 31 23 17.
- G. Install site sanitary sewage system piping to 5 feet of building. Connect to building sanitary waste system.
- H. Install Work in accordance with Local government Standards.

**87.5 INSTALLATION - MANHOLES**

- A. Install Work in accordance with Local government Standards.

**87.6 FIELD QUALITY CONTROL**

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
- B. Perform test on site sanitary sewage system in accordance with Local government Standards.
- C. Compaction Testing: In accordance with AASHTO T180.
- D. When tests indicate Work does not meet specified requirements, remove work, replace and retest.

**87.7 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

**END OF SECTION**



## SECTION 33 41 00

### STORM UTILITY DRAINAGE PIPING

#### PART 88 GENERAL

##### 88.1 SUMMARY

- A. Section Includes:
  - 1. Storm drainage piping.
  - 2. Accessories.
  - 3. Underground pipe markers.
  - 4. Catch basins and plant area drains.
  - 5. Cleanouts.
  - 6. Bedding and cover materials.
  
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Concrete type for [catch basin] [cleanout] base pad construction.
  - 2. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.
  - 3. Section 22 14 00 - Facility Storm Drainage: Product and execution requirements for storm drainage piping within 5 feet (1500 mm) of building.
  - 4. Section 31 05 13 - Soils for Earthwork: Soils for backfill in trenches.
  - 5. Section 31 05 16 - Aggregates for Earthwork: Aggregate for backfill in trenches.
  - 6. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
  - 7. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
  - 8. Section 31 23 23 - Fill: Requirements for backfill to be placed by this section.
  - 9. Section 33 05 13 - Manholes and Structures.
  - 10. Section 33 46 00 - Subdrainage: Termination of subdrainage tile system for connection to Work of this Section.

##### 88.2 UNIT PRICE - BASIS OF MEASUREMENT

- A. Pipe and Fittings:
  - 1. Basis of Measurement: By the linear foot.
  - 2. Basis of Payment: Includes excavating, bedding, pipe and fittings, granular cover, connecting to building service piping and to municipal sewer.
  
- B. Catch Basin and Cleanout:
  - 1. Basis of Measurement: By each unit for a nominal depth of four feet.
  - 2. Basis of Payment: Includes excavating, bedding, foundation pad, unit installation with accessories, connecting to sewer piping.

##### 88.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
  2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.
  3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
  4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
  5. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
  6. ASTM C924 - Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
  7. ASTM C969 - Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
  8. ASTM C1103 - Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
  9. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
  10. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  11. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
  12. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
  13. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
  14. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  15. ASTM D2751 - Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings.
  16. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
  17. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  18. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
  19. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
  20. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

#### 88.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data indicating pipe and pipe accessories.

- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

### **88.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for [salvaged] [and] [reused] products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

### **88.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents:
  - 1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### **88.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
- B. Perform Work in accordance with Local government Standard.

### **88.8 PRE-INSTALLATION MEETINGS**

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system, and municipal sewer utility service.

**PART 89 PRODUCTS****89.1 STORM DRAINAGE PIPING**

- A. Reinforced Concrete Pipe: ASTM C76.
  - 1. Fittings: Reinforced concrete.
  - 2. Joints: ASTM C443, rubber compression gasket.

**89.2 ACCESSORIES**

- A. Filter Fabric: Non-biodegradable, non-woven.
- B. Grout: Specified in Section 03 30 00 and Section 04 05 03.

**89.3 UNDERGROUND PIPE MARKERS**

- A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Storm Sewer Service" in large letters.

**89.4 CATCH BASINS AND PLANT AREA DRAINS**

- A. Catch Basin Lid and Frame:
  - 1. Construction: Cast iron construction, hinged lid.
  - 2. Lid Design: Linear grill.
  - 3. Nominal Lid and Frame Size: 24 x 36 inch.
- B. Shaft Construction and Cone Top Section: Reinforced precast concrete pipe sections, lipped male/female joints.
- C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00.

**89.5 CLEANOUTS**

- A. Cleanout Lid and Frame:
  - 1. Construction: Cast iron construction, hinged lid.
  - 2. Lid Design: Linear grill.
- B. Shaft Construction and Cone Top Section: Reinforced precast Concrete pipe sections, lipped male/female joints.
- C. Base Pad: Cast-in-place concrete of type specified in Section 03 30 00.

**89.6 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 31 05 16.
- B. Cover: As specified in Section 31 05 16.
- C. Soil Backfill from Above Pipe to Finish Grade: Soil, as specified in Section 31 05 13. Subsoil with no rocks over 6 inches in diameter, frozen earth or foreign matter.

**PART 90 EXECUTION****90.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

**90.2 PREPARATION**

- A. Hand trim excavations to required elevations. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter, which could damage piping or impede consistent backfilling or compaction.

**90.3 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 17 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

**90.4 INSTALLATION - PIPE**

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- B. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Install aggregate at sides and over top of pipe. Install top cover to minimum compacted thickness of 12 inches, compact to 95 percent.
- D. Refer to Section 31 23 23 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

- E. Refer to Section 33 05 13 for manhole requirements.
- F. Connect to municipal storm sewer outlets through installed sleeves.
- G. Install trace wire continuous over top of pipe buried 6 inches below finish grade coordinate with Section 31 23 23
- H. Connect to subdrainage tile system piping. Refer to Section 33 46 00.
- I. Install Work in accordance with Local government Standards.

#### **90.5 INSTALLATION - CATCH BASINS AND CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place Cast-In-Place Concrete base pad, with provision for storm sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.
- D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

#### **90.6 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection prior to [and immediately after] placing aggregate cover over pipe.
- C. Compaction Testing: In accordance with AASHTO T180.
- D. When tests indicate work does not meet specified requirements, remove work, replace and retest.

#### **90.7 PROTECTION OF FINISHED WORK**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.
  - 1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.
- C. Repair or replace pipe that is damaged or displaced from construction operations.

**END OF SECTION**

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NCCCS: 2657  
Division 33 - Utilities

CDL Instructional Training Facility  
Nash Community College





## **SECTION 33 42 13**

### **PIPE CULVERTS**

#### **PART 91 GENERAL**

##### **91.1 SUMMARY**

- A. Section Includes:
  - 1. Corrugated steel pipe culvert.
  - 2. Concrete pipe culvert.
  - 3. Joints and accessories.
  - 4. Bedding.
  - 5. Slope protection at pipe end.
  
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Concrete grout fill to adjacent construction.
  - 2. Section 31 05 16 - Aggregates for Earthwork.
  - 3. Section 31 23 17 – Trenching
  - 4. Section 31 23 16 - Excavation: Excavating for culvert piping.
  - 5. Section 31 32 14 - Cement Soil Stabilization.
  - 6. Section 31 32 15 - Lime Soil Stabilization.
  - 7. Section 31 37 00 - Riprap.

##### **91.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Pipe Culvert:
  - 1. Basis of Measurement: By linear foot and diameter in inches.
  - 2. Basis of Payment: Includes hand trimming excavating; removing soft subsoil, bedding fill, compacting; pipe, fittings and accessories assembled; repair of damaged coating.

##### **91.3 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M294 - Specification for Corrugated Polyethylene Pipe, 305- to 915-mm (12- to 36-In.) Diameter.
  - 2. AASHTO T99 - Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 lb) Rammer and a 305 mm (12 in.) Drop.
  - 3. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM A929/A929M - Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe.
  - 2. ASTM C14 - Standard Specification for Concrete Sewer, Storm Drain, and Culvert Pipe.

3. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
4. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
5. ASTM C506 - Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe.
6. ASTM C507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe.
7. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3- 8. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3- 9. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- 10. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).</sup></sup>

#### 91.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pipe, fittings and accessories.
- C. Manufacturer's Installation Instructions: Submit special procedures required to install Products specified.

#### 91.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  1. Materials Resources Certificates:
    - a. Certify source and origin for [salvaged] [and] [reused] products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### 91.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

- B. Project Record Documents:
  - 1. Accurately record actual locations of pipe runs, connections, and invert elevations.
  - 2. [Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.]
- C. Operation and Maintenance Data: Procedures for submittals.

## 91.7 QUALITY ASSURANCE

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content [including:] [.]
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site [including:] [.]
- B. Perform Work in accordance with [[State] [Municipality] of [\_\_\_\_\_]] [Highways] [Public Work's] standard.]

## 91.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene one week prior to commencing Work of this section.

## PART 92 PRODUCTS

### 92.1 CONCRETE CULVERT PIPE

- A. Reinforced Circular Concrete Pipe: ASTM C76.
  - 1. Bell and spigot end joints:
  - 2. Shape: Circular.
- B. Reinforced Concrete Pipe Joint Device: ASTM C443, rubber compression gasket joint.

### 92.2 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 05 16.
- B. Cover: As specified in Section 31 05 16.

### 92.3 ACCESSORIES

- A. Geotextile Fabric: Non-biodegradable, non-woven.
- B. Fill at Pipe Ends: Concrete grout fill as specified in Section 03 30 00.
- C. End of Culvert Gratings

**93.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

**93.2 PREPARATION**

- A. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

**93.3 EXCAVATION AND BEDDING**

- A. Excavate culvert trench to 12 inches below pipe invert, for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to 95 percent.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.
- D. Place filter fabric over compacted bedding.

**93.4 INSTALLATION - PIPE**

- A. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
- B. Shore pipe to required position; retain in place until after compaction of adjacent fills. Ensure pipe remains in correct position and to required slope.
- C. Repair surface damage to pipe protective coating with two coats of compatible bituminous paint coating.
- D. Install cover at sides [and over top of pipe]. [Install top cover to minimum compacted thickness of 12 inches.
- E. Maintain optimum moisture content of bedding material to attain required compaction density.
- F. Place filter fabric over compacted cover.
- G. Install culvert end gratings.
- H. Refer to Section 31 23 23 and Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

- A. Place fill at pipe ends, as indicated on Drawings.

**93.6 ERECTION TOLERANCES**

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Lay pipe to alignment and slope gradients noted on [Drawings]; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Maximum Variation From Intended Elevation of Culvert Invert: ½ inch.
- D. Maximum Offset of Pipe From Indicated Alignment: 1 inch.
- E. Maximum Variation in Profile of Structure From Intended Position: 1 percent.

**93.7 FIELD QUALITY CONTROL**

- A. Section [01 40 00 - Quality Requirements] [01 70 00 - Execution and Closeout Requirements]: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection prior to [and immediately after] placing aggregate cover over pipe.
- C. Compaction Testing: In accordance with AASHTO T99 and AASHTO T180.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

**93.8 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect pipe and bedding from damage or displacement until backfilling operation is in progress.

**END OF SECTION**



## **SECTION 33 46 00**

### **SUBDRAINAGE**

#### **PART 94 GENERAL**

##### **94.1 SUMMARY**

- A. Section Includes:
  - 1. Building perimeter drainage system.
  - 2. Retaining wall drainage system.
  - 3. Slab-on-grade drainage system.
  - 4. Filter aggregate and fabric.
  - 5. Bedding.
  
- B. Related Sections:
  - 1. Section 05 50 00 - Metal Fabrications: Access covers and frames to cleanouts in weep drainage system.
  - 2. Section 22 40 00 - Plumbing Fixtures.
  - 3. Section 31 05 13 - Soils for Earthwork.
  - 4. Section 31 05 16 - Aggregates for Earthwork.
  - 5. Section 31 23 16 - Excavation: Excavating for site subdrainage system piping and surrounding filter aggregate.
  - 6. Section 31 23 23 - Fill: Backfilling over filter aggregate, up to subgrade.
  - 7. Section 33 31 00 - Sanitary Utility Sewerage Piping: Effluent discharge.
  - 8. Section 33 41 00 - Storm Utility Drainage Piping: Connection to weep drainage system.

##### **94.2 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Pipe and Fittings:
  - 1. Basis of Measurement: By linear foot.
  - 2. Basis of Payment: Includes hand trimming excavating, bedding, pipe and fittings, filter aggregate, filter fabric, connecting to municipal storm sewer.

##### **94.3 REFERENCES**

- A. ASTM International:
  - 1. ASTM C412 - Standard Specification for Concrete Drain Tile.
  - 2. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

##### **94.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
  
- B. Shop Drawings: Indicate dimensions, layout of piping, high and low points of pipe inverts, and gradient of slope between corners and intersections.

- C. Product Data: Submit data on pipe drainage products and pipe accessories.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

#### **94.5 SUSTAINABLE DESIGN SUBMITTALS**

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
  - 1. Materials Resources Certificates:
    - a. Certify source and origin for salvaged and reused products.
    - b. Certify recycled material content for recycled content products.
    - c. Certify source for local and regional materials and distance from Project site.
- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
  - 1. Provide cost data for the following products:
    - a. Salvaged products.
    - b. Reused products.
    - c. Products with recycled material content.
    - d. Local and regional products.

#### **94.6 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record location of pipe runs, connections, cleanouts and principal invert elevations.
- C. Operation and Maintenance Data: Procedures for submittals.

#### **94.7 QUALITY ASSURANCE**

- A. Sustainable Design Requirements:
  - 1. Recycled Content Materials: Furnish materials with recycled content.
  - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.
- B. Perform Work in accordance with Local government Standards.

### **PART 95 PRODUCTS**

#### **95.1 PIPE MATERIALS**

- A. Furnish materials in accordance with Local government Standards.
- B. Polyvinyl Chloride Pipe: ASTM D2729; plain end; with required fittings.



- C. Corrugated Plastic Tubing: Flexible type; with required fittings.
- D. Use perforated pipe at subdrainage system; unperforated through sleeved walls.

## 95.2 AGGREGATE AND BEDDING

- A. Filter Aggregate and Bedding Materials: As specified in Section 31 05 16.

\*\*\*\*\* [OR] \*\*\*\*\*

- B. Filter Sand and Bedding Materials: As specified in Section 31 05 16.

## 95.3 ACCESSORIES

- A. Pipe Coupling: Solid plastic.
- B. Filter Fabric: Water pervious type, black polyolefin or polyester or reasonable substitute.
- C. Pipe Sleeve: Steel type for foundation wall.

## PART 96 EXECUTION

### 96.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut excavated base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

### 96.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with coarse aggregate.
- B. Remove large stones or other hard matter which could damage drainage piping or impede consistent backfilling or compaction.

### 96.3 INSTALLATION

- A. Place drainage pipe on clean cut subsoil.
- B. Lay pipe to slope gradients noted on Drawings with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Place pipe with perforations facing down. Mechanically join pipe ends.
- D. Install pipe couplings.
- E. Install aggregate at sides, over joints and top of pipe. Install top cover compacted thickness of 12 inches.

- F. Place filter fabric over leveled top surface of aggregate cover prior to subsequent backfilling operations.
- G. Place aggregate in maximum 4 inch lifts, consolidating each lift.
- H. Refer to Section 31 23 23 for compaction requirements. Do not displace or damage pipe when compacting.
- I. Place impervious fill over drainage pipe aggregate cover and compact.
- J. Connect to storm sewer system with unperforated pipe through installed sleeves.
- K. Coordinate the Work with connection to municipal sewer utility service and trenching.

#### **96.4 FIELD QUALITY CONTROL**

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Request inspection prior to and immediately after placing aggregate cover over pipe.

#### **96.5 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.

**END OF SECTION**